DOCUMENT RESUME

ED 334 355 CE 058 273

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TITLE The Mississippi Literacy Assessment. SSRC Report 91-1.
INSTITUTION Mississippi State Univ., Mississippi State. Social Science Research Center.
SPONS AGENCY Mississippi Governor's Office for Literacy, Jackson.; Mississippi State Employment Security Commission, Jackson.
PUB DATE Apr 91
NOTE 161p.
AVAILABLE FROM Social Science Research Center, P.O. Box 5287, Mississippi State, MS 39762.
PUB TYPE Reports - Evaluative/Feasibility (142)

EDRS PRICE MF01/PC07 Plus Postage.
DESCRIPTORS Adult Basic Education; *Adult Literacy; Adults; *Educational Assessment; *Educational Attainment; *Educational Needs; Literacy Education; State Surveys; Statewide Planning
IDENTIFIERS *Mississippi; Numeracy

ABSTRACT

Persons aged 16 to 75 in 1,803 Mississippi households were interviewed over 6 months in 1990 to develop a profile of the literacy proficiencies of the adult population of the state. Results were reported in three areas of task types: prose literacy, document literacy, and quantitative literacy. Some of the findings were the following: (1) Mississippi has very few total nonreaders among its adult population; (2) older adults who have had less formal education had more severe problems than others; (3) literacy problems extend across racial lines, educational experiences, and income levels, but there are very few non-English-speaking adults in the state; (4) prose literacy was generally better than document literacy, and quantitative literacy was usually strong; (5) members of households that receive public assistance function at considerably lower levels of proficiency than those in households receiving no public assistance; (6) approximately 35 percent of adults are reading below intermediate levels; (7) skilled and unskilled laborers function at lower levels of literacy than those who are professionals, managers, technicians, or in clerical or sales positions; (8) educational attainment, race, and parents' education level are most clearly associated with literacy; and (9) 38 percent of high school graduates and 12 percent of college graduates function below the intermediate level on the prose scale. (An appendix discusses survey methodology. A list of 18 references is provided.) (KC)

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THE MISSISSIPPI LITERACY ASSESSMENT

A Report To

THE MISSISSIPPI EMPLOYMENT
SECURITY COMMISSION

and

THE GOVERNOR'S OFFICE FOR LITERACY
STATE OF MISSISSIPPI

BEST COPY AVAILABLE

by

Arthur G. Cosby
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Social Science Research Center
Mississippi State University
April 1991

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The Mississippi Literacy Assessment Project is funded by the Mississippi Employment Security Commission and the Social Science Research Center at Mississippi State University. The project has benefited greatly from the cooperation and assistance of the Governor's Office for Literacy, the State of Mississippi and the Educational Testing Service of Princeton, New Jersey.

SSRC Report 91-1

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A person who knows how to read holds the power to improve the quality of his or her life and to make that life fuller and more productive. Every individual has the capacity to learn, but native ability without education is merely untapped potential.

As we stand upon the brink of a new century, Mississippi's future and our own destiny rest in our hands. If Mississippi is to move ahead, we cannot ignore our citizens who lack the basic skills. A state with a literate citizenry is equipped to face tomorrow's challenges; a state without it will be left behind. In order to meet tomorrow's demands, we must produce a state of functional readers, creative thinkers, and problem solvers today. The plans and goals that we establish now must be relevant to today's needs yet visionary enough to carry us into the next century.

The information contained in the Mississippi Literacy Assessment will serve the State in a number of ways: it will help us target our literacy efforts toward those most in need; it also will help us establish performance goals for programs and learners whose aim is to improve their skills for employment. And the results profiled here will enable us to measure our progress as we move toward the goal of a literate Mississippi by the Year 2000.

We have already begun to address in many ways the literacy problems that this report highlights, but we must do more. We have a blueprint for action in Mississippi's Better Education for Success Tomorrow (BEST). There is no better case for why we need to move forward in education reform than the information presented here.

There is much to be learned from our history about the literacy problem we face as a State. The key for the future and for how our history will be written is how we deal with problems we face today. Our faith in Mississippians - in adult learners, in our families, schools, and communities- makes us hopeful that our efforts today will mean a brighter future for us all.

Ray and Julie

RAY AND JULIE MABUS

ACKNOWLEDGEMENTS

The Mississippi Literacy Assessment project has benefited greatly from the contributions of a large number of individuals who are interested in literacy research and issues. The project staff, interviewers, consultants, and numerous others have given generously of their time to the completion of this substantial research enterprise.

Dr. Maxie P. Kohler deserves recognition for her leadership in supervising the data collection and field work aspects of the project. Her staff had the responsibility of collecting over 1800 interviews located in well over 500 research sites throughout Mississippi.

We owe a large intellectual debt to the team of scientists at the Educational Testing Service who are developing the National Adult Literacy Survey. Dr. Irwin Kirsch's contributions constitute both the conceptional and research foundation for the Mississippi Literacy Assessment. His colleagues, Jules Goodison, Doug Rhodes, and Norma Norris have been generous in sharing their expertise and time advising us on many of the difficult research demands of assessing adult literacy.

Dr. Keith Rust of Westat has significantly contributed to this research by advising on a number of sampling issues, as a part of an independent review of the survey methodology. We are most grateful that he has consented to participate in this report by co-authoring the methods appendix.

There are a number of individuals in the Social Science Research Center who have shared their expertise in the conduct of the research and preparation of this report. Among those deserving of recognition are Rhonda Bates, Ruth Haug, Linda Graves, Elizabeth Hawkins, Dorris Baggett, Judy Schexnayder, Marty Keith, Christy Hamm, Undrea Allen, Keith Noland, Anthony Anderson, Ernest Jakins, Barbara Goodnite, Janna Steele and Jade Aggregade.

The State of Mississippi also deserves recognition for having both the commitment to solving literacy problems and the vision to realize the need for reliable information about literacy. The inspiration for the study must in large part be attributed to Mr. Karl Haigler, of the Governor's Office for Literacy. Karl's drive, persistence, and energy have been key forces in keeping the project on track. Also the leadership of the Mississippi Employment Security Commission deserves recognition for allocating the majority of the financial resources necessary to conduct the survey.

Finally, the project simply could not have been done without the cooperation of over 1800 Mississippians who served as research subjects. We are truly grateful for their generosity in allowing us to enter their homes for the purpose of assessing their literacy proficiency. We hope that this report will partially repay our great debt to them.

While we fully recognize the excellent contributions of others, it should be made explicit that the report is the responsibility of the authors.

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EXECUTIVE SUMMARY*

Based on 1,803 individual household interviews of Mississippi adults (ages 16 to 75), the Mississippi Literacy Assessment Report profiles the literacy proficiencies of the adult population. The Social Science Research Center has worked with assessment and sampling experts to ensure that the adults chosen to participate in the study are representative of the State's adult population. The data collection effort extended over a six month period in the spring and summer of 1990. The survey was marked by a high degree of cooperation from those interviewed. The study also benefited greatly from the support of the Mississippi Economic Security Commission, the U.S. Department of Labor, and the Educational Testing Service.

The survey assessment instrument, developed by the Educational Testing Service (ETS), calls upon the reading, writing, math, and information processing skills of adults in completing open-ended, multiple response tasks. The use of simulated, open-ended tasks to assess literacy skills assumes a definition of literacy that is more "functional" in nature; that is, the scale scores measure the abilities of adults to apply their basic skills of reading, writing, and math to those kinds of tasks which adults face in their everyday lives--on the job, at home, and in their communities. The ETS instrument was first used in a national literacy survey of young adults, ages 21-25, in 1985. The difficulty of the items has been scientifically determined by ETS and can

**The Executive Summary was written by Karl O. Haigler, Special Advisor to the Governor, Office For Literacy, The State of Mississippi.*

be calibrated on a scale of 0 to 500. In profiling literacy skills, the items chosen for the assessment are arrayed in three basic areas which capture the ways adults apply their basic skills: prose literacy, document literacy, and quantitative literacy.

The scores provided below are reported as scale scores. A major task for analysis is connecting the range of item tasks with particular points on the ETS scale. Also, the profile of adult literacy proficiencies is arrayed across three areas of task types:

- **prose literacy:** the knowledge and skills needed to understand and use information from texts that include editorials, news stories, and poems;

- **document literacy:** the knowledge and skills required to locate and use information contained in job applications or payroll forms, bus schedules, maps, tables, and indexes;

- **quantitative literacy:** the knowledge and skills needed to apply arithmetic operations, either alone or sequentially, that are embedded in printed materials, such as in balancing a checkbook, figuring out a tip, completing an order form, or determining the amount of interest from a loan advertisement.

As will become obvious from the detailed analysis of results, literacy proficiency is not the same over the three areas: a person performing at one level on the prose scale might score higher or lower on either the document or

quantitative scale. This can be seen on a State level by comparing mean scores across the scales as well as performance within demographic groups. The key to interpreting the meaning of the scale scores is the association of a particular point on either the prose, document, or quantitative scale with the kinds of tasks that performance at that level would indicate that an individual can complete with a high degree of proficiency. For instance, a person performing at the 260 level has an 80% probability of performing the following tasks successfully:

Prose: identifying information in a biographical article, identifying members of a category in a lengthy text, or locating information in a short non-fiction article.

Document: entering account information on a bank withdrawal form, identifying a TV show using a bar chart, or using a table to identify specific items of information in a particular category.

Quantitative: calculating the cost of a number of identical items on a grocery receipt, determining the difference between the length of business hours on weekdays and weekends, or adding two or three checks on a bank deposit slip.

It is possible that a person performing at a 260 level can also complete those tasks higher on the scale, tasks that become more complex in their demands on information processing skills or that call for more extensive background knowledge; but, the higher on the scale from any given point on the scale, the less likelihood a person would have of performing such a task with a high degree of proficiency. At the same time, attaining such a level means that a

person can perform those tasks lower on the scales with more than an 80% degree of proficiency.

Mississippi's literacy assessment was done concurrently with two other projects: Oregon used the same instrument with a sample of 2000 adults, ages 16 to 64; and ETS, under contract with the Department of Labor, assessed a national sample of Job Training Partnership Act (JTPA) clients as well as persons using the Employment Service. These other projects will enable Mississippi to compare its results with those of Oregon and those of the national JTPA survey. Also, in 1992 ETS will conduct the National Adult Literacy Survey which will, for the first time, establish the nature and extent of the literacy problem for the nation as a whole. Since all of these surveys and the 1985 study of young adults use the same scale scoring system, it will be possible for Mississippi to compare the relative performance of adults in the State with those of national studies past and future.

This assessment's functional measurement of literacy differs from the ways in which states have used Census data to report literacy rates: states typically have relied on the Census report of the number of years of formal schooling completed that individuals report as a proxy for literacy proficiency. Those without a high school and college diploma are often assumed to be "functionally illiterate" and those who have high school and college diplomas to be "literate." The innovative scale scoring, direct assessment of literacy proficiency

represents an advance over reliance on Census data for the purposes of policy and program planning. For instance, Mississippi will be able to measure the impact of its literacy and adult education programs as "value added" efforts that help raise the literacy rate of the State using this assessment as an initial reference point.

At the same time, there is no simple distinction implied in the use of the scale scoring system between the "literate" and the "illiterate." At no one point on any scale is it possible or desirable to say that those falling on one side can function in all contexts and meet all the demands of everyday life and that those on the other cannot function at all. Rather, it is now possible to consider the skills of the adult population of the state relative to the wide range of everyday tasks that call on the ability to "use printed or written information to function in society, to achieve one's goals, and to develop one's knowledge and potential." Such a definition of literacy has guided ETS's research for the past six years and will be used in the National Adult Literacy Survey in 1992.

Findings:

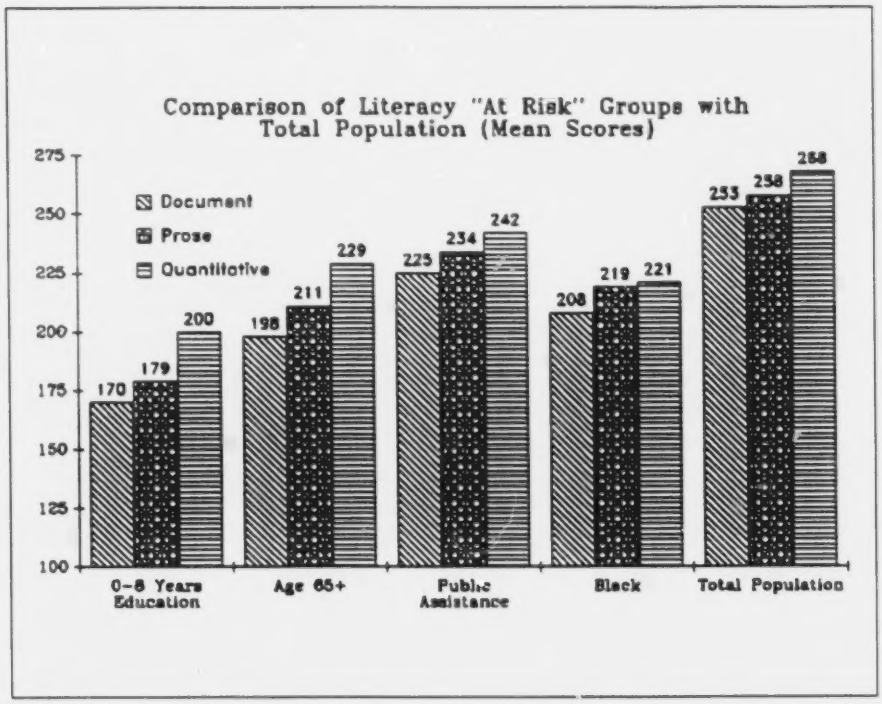
• Mississippi has very few total non-readers among its adult population, ages 16 to 75--less than 2% of adults cannot sign their name on a Social Security card, over 90% can read simple directions on a medicine bottle, and approximately 8% cannot recognize a road sign at an intersection.

• Those who experience the most severe problems with literacy are typically older and have had less formal education than those functioning at higher levels--this relatively small percentage (5%) however, still equates to almost 100,000 adults needing help. Currently, most who seek assistance with literacy tasks go to friends or family members.

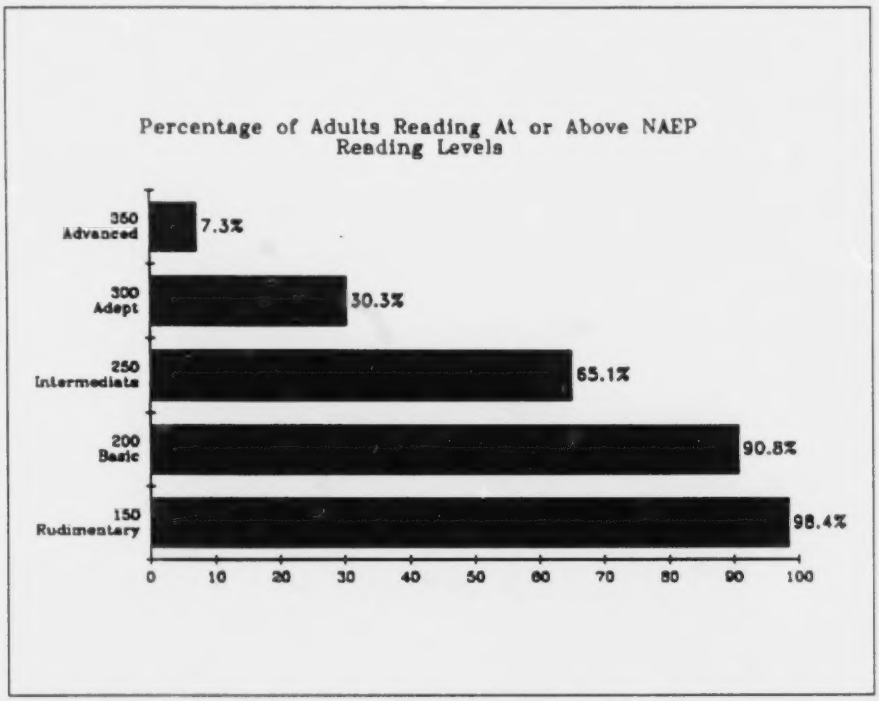
• The State's literacy problem extends across racial lines, educational experience, and income levels, but it is mostly "home grown"--there are very few non-English speakers in the adult population.

• The average Mississippian is functioning at the 260 level on average across prose, document, and quantitative literacy scales: Quantitative literacy is a relative strength among most population groups and document literacy is relatively weak.

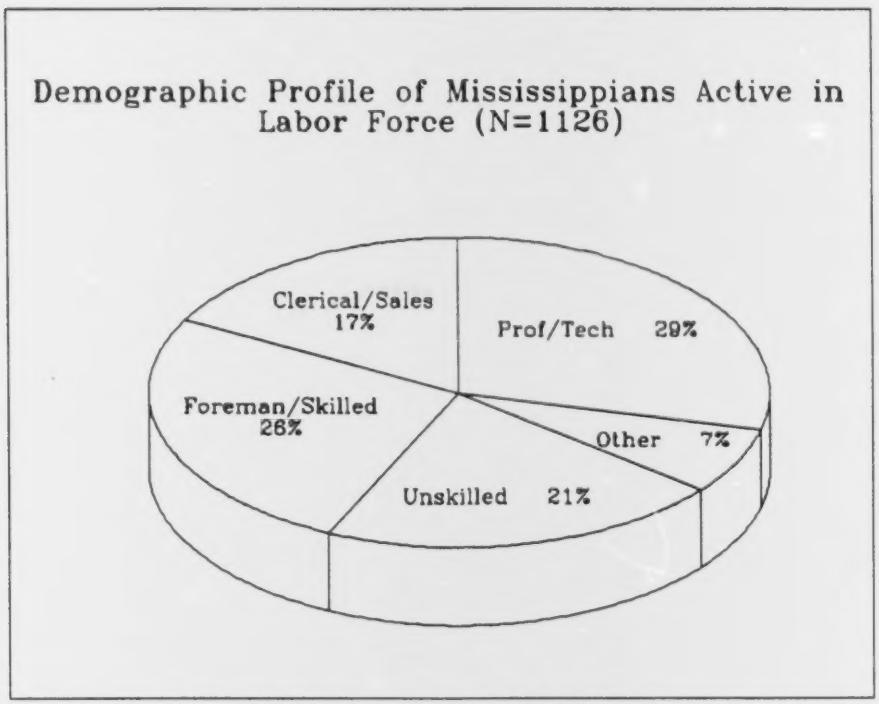
• Those Mississippians in households that receive public assistance function at appreciably lower levels of proficiency than those households which receive no public assistance.

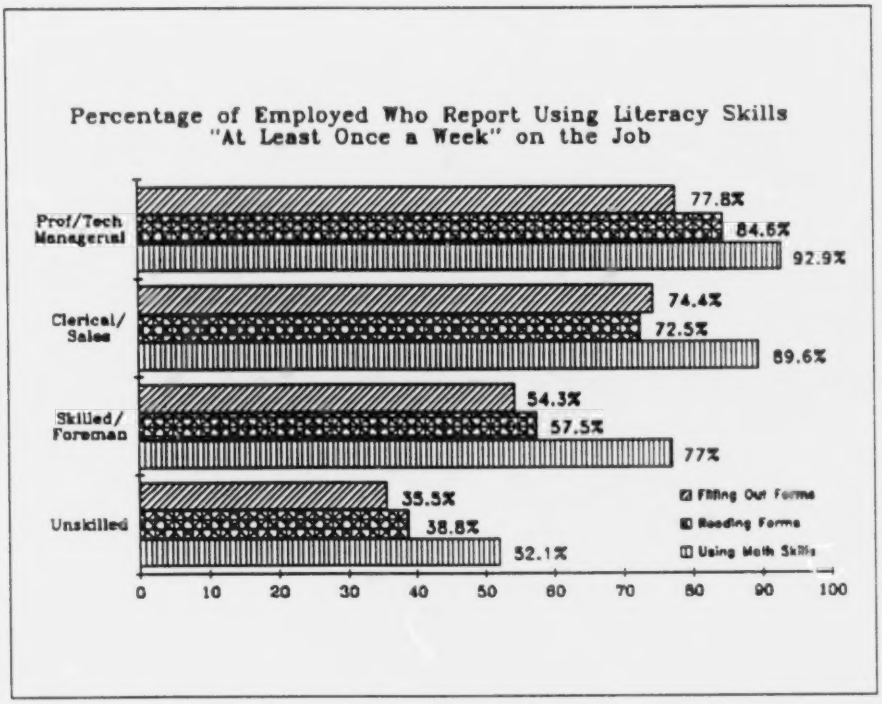

Comparison of Literacy "At Risk" Groups with Total Population (Mean Scores)
275
250
225
200
175
150
125
100
Document
Prose
Quantitative
170
179
200
198
211
229
225
234
242
208
219
221
253
258
268
0-8 Years Education
Age 65+
Public Assistance
Black
Total Population

• Using National Assessment of Educational Progress' measures of school-based reading ability, 35% of adults (almost 700,000) are reading below intermediate levels, which means they will have difficulty searching for specific information, interrelating ideas, summarizing and explaining relatively complicated information, or learning from specialized reading materials.

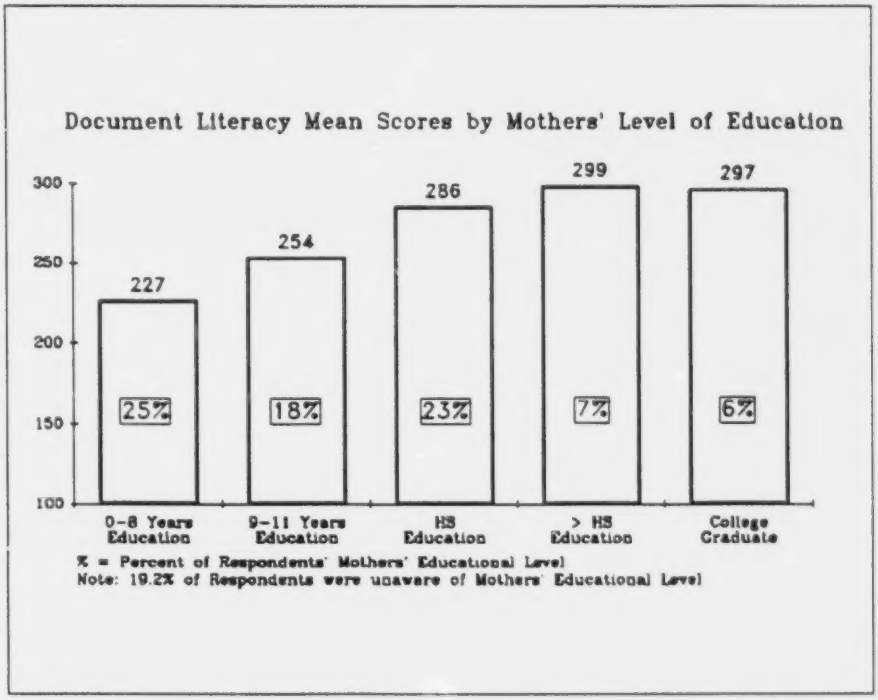


• While employed Mississippians report frequent use of literacy skills on the job, skilled and unskilled laborers function at lower levels of literacy than those who are professionals, managers, technicians, or in clerical or sales positions.



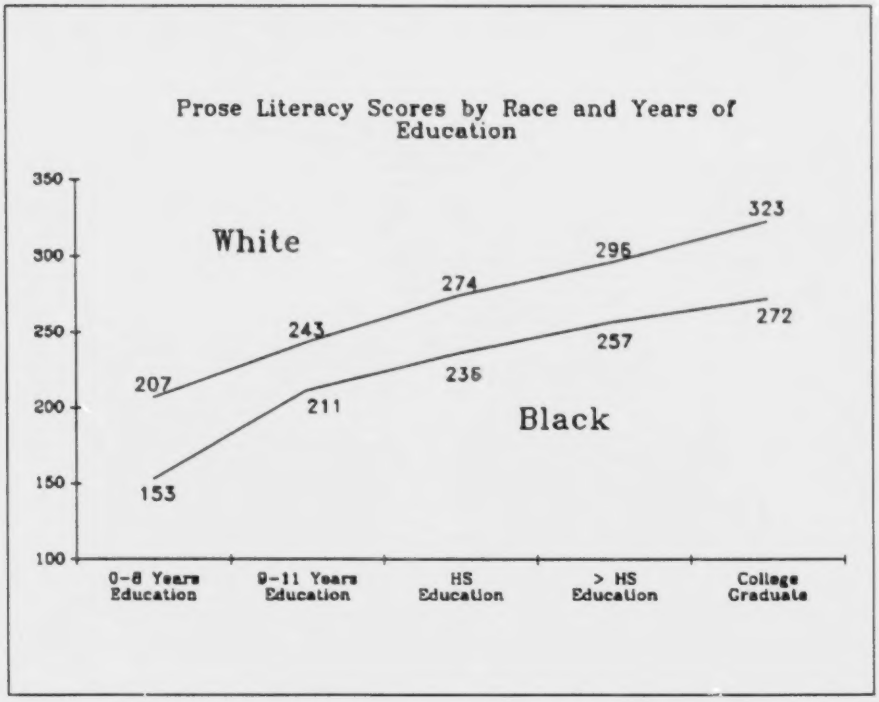

Percentage of Employed Who Report Using Literacy Skills
"At Least Once a Week" on the Job
Prof/Tech Managerial
77.8%
84.6%
92.9%
Clerical/ Sales
74.4%
72.5%
89.6%
Skilled/ Foreman
54.3%
57.5%
77%
Unskilled
35.5%
38.8%
52.1%
Filling Out Forms
Reading Forms
Using Math Skills
0
10
20
30
40
50
60
70
80
90
100

• The factors that are most clearly associated with literacy proficiency are educational attainment, race, and parents' education level.



The way to read this chart: "The mean score for those adults whose mothers had less than nine years of formal schooling scored is 227 in document literacy. From the total of adults in this sample, 25% reported that their mothers had less than nine years of formal schooling."

• Based on projections from assessment data, it is possible to approximate literacy rates for Mississippi's 82 counties. Of these, it appears that half of the out-of-school adults in 26 counties could be classified "at risk" in that projections of median scores for these counties would place these adults at or below the 250 level on the prose scale.



• There are significant differences across all three scales between blacks and whites in spite of similar educational attainment.

• Though credentials are related positively to the ability to perform tasks on all three scales, even Mississippians with high school diplomas and college degrees experience difficulty with relatively uncomplicated tasks; for example, 38% of high school graduates and 12% of college graduate function below the 250 level on the prose scale, which means that they would have difficulty completing the following kinds of tasks:

Interpret instructions from an appliance warranty	Orally interpret distinctions between two types of employee benefits
Locate information in a news article	Write a letter stating that an error has been made in billing
Correctly interpret a theme of a short poem	State in writing argument made in lengthy newspaper column

Conclusion:

In the final analysis, how the literacy problem in Mississippi is defined must be connected to how it is going to be solved. As this study shows, there are many dimensions to the literacy problem in the state: the problem ranges from those adults who are older with little formal education to those younger high school and college graduates who do not display high levels of competence in completing relatively uncomplicated tasks. However the problem is defined, there are large numbers of adults who, with higher literacy skills, would be more capable of satisfying their own individual goals and whose prospects for employment or advancement in their current jobs would be improved. And to the extent that this challenge can be met over the next ten years, the future for Mississippi's children will be brighter: the adult literacy problem is inextricably intertwined with the success of education reform as well as economic development.

There are now in place a variety of programs serving adults, some of which directly address the kinds of literacy problems profiled in this study. Nationally, the goal of a literate adult population by the year 2000 calls for the kinds of measures used in the Mississippi Literacy Assessment to establish the parameters of the problem. The ability to measure the State's progress in solving the literacy problem was the basis for this study. The information provided here and contained in the public use data file can continue to serve the state--in improving policies and programs--and can establish a reference

point for future assessments of adult literacy. Further field research, linking literacy proficiency with job performance, will be important to ensure that the literacy needs of adults will be addressed in such a way as to improve individual employment opportunities and the competitive position of Mississippi business and industry.

Section 1. Introduction

Modern societies are characterized by a high level of technological complexity and a high dependency on information. "High technology" and "information age" labels have been coined to capture the core significance of these trends for present and future development. Successful societies, especially in the arena of economics, appear to be those that effectively collect, process, manage, and utilize wide arrays of information. Competitive advantages in the world's marketplace, then, can be tied closely to the skill levels of the labor force and the ability to meet the "high technology/ information age" challenge. Clearly, there is an increasing and essential need for higher levels of workplace literacy skills.

When the Southern Regional Literacy Commission says, "Literacy is Everybody's Business," the Commission is recognizing the importance of improving literacy as a necessary element in the advancement of the South.[1]

Many observers believe that the South has lagged behind the rest of the nation in its literacy skills. In Mississippi, for example, it has been estimated that as many as 400,000 of the 1.9 million adults have significant literacy shortcomings.[2] This condition is thought to contribute directly to the state's low levels of social and economic achievement. Strong arguments can be made that persistent poverty, low worker productivity, poor health, high infant mortality, low levels of citizen participation in government, and a number of related difficulties can be traced to problems of literacy.

> ***Adult literacy efforts in the South are hamstrung by a lack of reliable data with which to establish goals or hold individual programs accountable for the progress--or lack of it--made by their adult students. Well constructed, in-depth literacy surveys have never been administered to measure the functional literacy of adults on a state-by-state basis. Without such a literacy profile, it will be difficult for any state to develop measurable objectives for its literacy efforts.***
>
> *-Southern Regional Literacy Commission 1990.*

While literacy clearly is an important issue for both the South and Mississippi, there is relatively little reliable information that can be used to directly assess its nature and extent. There has been no dependable means of knowing the direction and degree of changes in adult literacy. Estimates of the

scope of literacy within the state largely have been dependent on the use of census reports of completed years of education. Such limited information is inadequate for understanding the dimensions of literacy, whether the concern is basic understanding, program accountability, or program design.

The Mississippi Literacy Assessment Project grew out of the recognized need for reliable information about literacy within Mississippi. The Governor's Office for Literacy, the Mississippi Employment Security Commission, and the Social Science Research Center at Mississippi State University have jointly sponsored an effort to provide a comprehensive study of adult literacy within the state. From the beginning, the commonly held goals have been to provide Mississippi with literacy data that 1) were representative of the adult population of the state, 2) were based on the most advanced literacy measurement techniques, and 3) included a wide range of background information.[3]

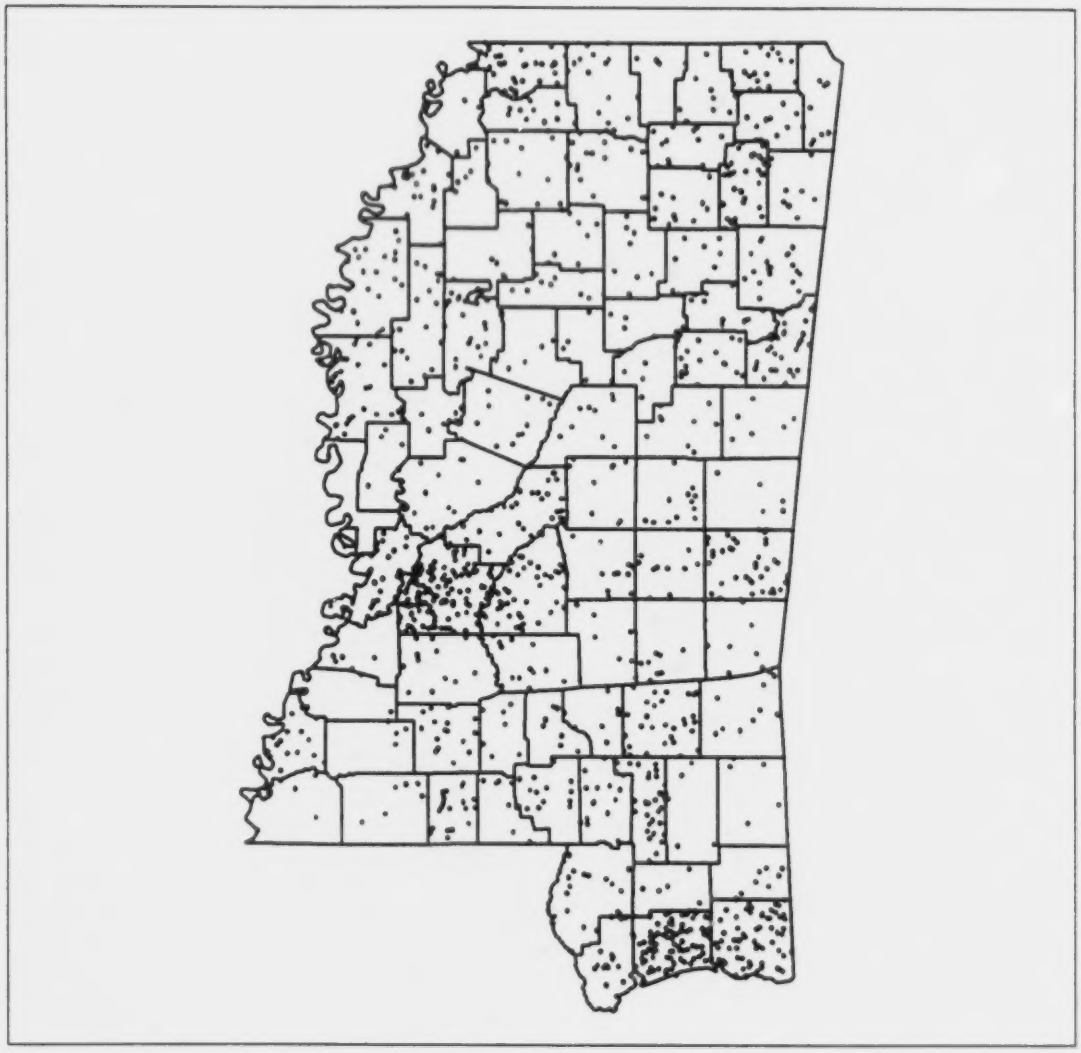
During 1990, personal interviews were completed with approximately 1,800 adult Mississippians located throughout the state. Chart 1 presents a population distribution map of Mississippi in which each dot on the map corresponds to 2,000 individuals. The map is designed to depict the geographic distribution of the population. Chart 2 presents a second distribution map of Mississippi, but in this chart each dot depicts one individual in the Mississippi Literacy Assessment Project sample.[4] A careful visual comparison of both

Charts 1 and 2 will reveal a great deal of similarity in the distribution patterns of the population and sample. These patterns are indicative of the success the sample design had in distributing interviews across the state in proportion to actual population concentrations. A complete description of the project sample can be found in the project codebook.[5]

Each interview was designed to last one and one-half hours. One hour of the interview was devoted to the administration of the National Assessment of Education Progress (NAEP) Adult Literacy Assessment. This instrument was developed by Irwin Kirsch and his colleagues at the Educational Testing Service and represents pioneering work in the measurement of adult skills.[6] The remaining one-half hour of the interview was used to collect demographic and personal background information. A modified version of the NAEP-Young Adult Background Questionnaire was utilized to collect this information. It is this survey that provides the data for this study.

Information from the Mississippi Literacy Assessment Project can provide a number of important benefits to the state. It should add substantially to our overall understanding of the Mississippi literacy problem. The assessment can provide a basis for comparing the skill levels of adult Mississippians to those of adults of other state, regional, and national populations. Within Mississippi, it now is possible to contrast the literacy skills of the major demographic and social groupings.

Chart 1: Distribution of the Population of Mississippi 1990 (Each Dot = 2000 Individuals)



Population Estimates from Woods and Poole, Inc.

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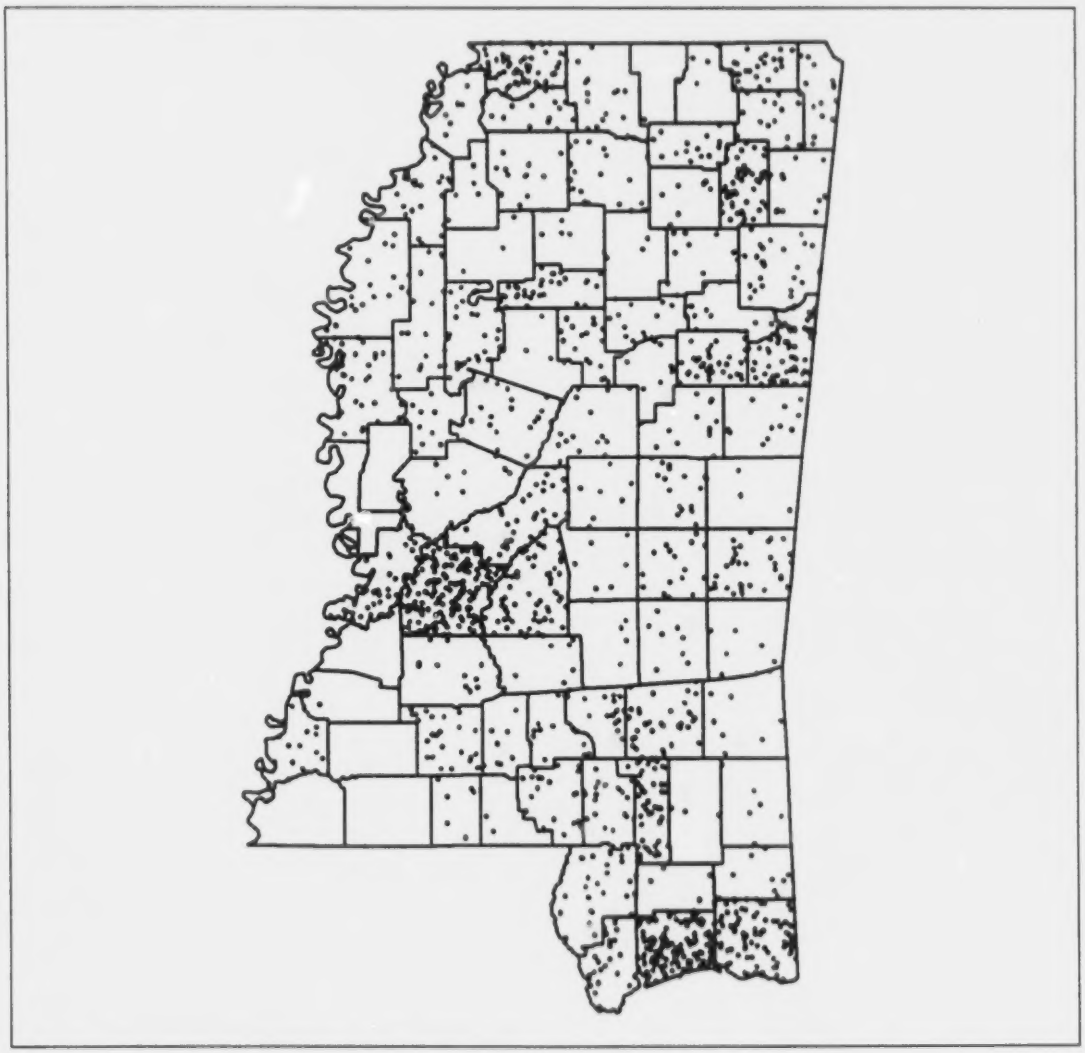
Chart 2: Sample Distribution of the Mississippi Literacy Assessment Project Sample (Each Dot = 1 sample number, n = 1,791)



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By distinguishing between types of literacy problems, the assessment can identify specific areas of literacy needs. The inclusion of background variables furnishes policymakers and program providers an improved understanding of the influences underlying literacy development and the ability to target specific groups for intervention. It also is possible to associate literacy measures with a wide range of relevant behaviors. When this information is taken collectively, it can be used to establish baseline estimates of literacy by which efforts to improve the population's skills can be judged.

The Mississippi Literacy Assessment Project, like all research endeavors, is structured by a set of perspectives, definitions, and assumptions that shape and color all aspects of the study.[7]

As a point of departure, discussions about literacy in the United States have classified people as either literate or illiterate. This tendency apparently grew out of a period when most citizens had little or no formal education and as a result were easily defined as illiterate. This simple dichotomy still is used frequently when the issue of literacy is addressed. One of the first questions asked by most individuals is "How many illiterates are there?" While this question has a great deal of common sense appeal, it does not take into account the complexities of literacy in contemporary society. It is asking a nineteenth-century question when a twenty-first century answer is needed.

> *There is no single measure or specific point on a scale that separates the "literate" from the "illiterate".*
>
> *-Irwin Kirsch and Ann Jungeblut, Literacy: Profiles of America's Young Adults 1986.*

Much of the current thinking involves the notion of a continuum of literacy that ranges from the extremely illiterate at one pole to the extremely literate at the other. The continuum view is based on the observation that most people who could be classified as illiterate by traditional definitions are clearly literate in many aspects of their lives. Conversely, everyone who could be classified as literate by traditional means would certainly be illiterate in some arenas. The notion of a continuum is not unique to research on literacy. It has frequently been used in the definition and measurement of mental ability, achievement, and academic performance. The perspective of this study explicitly assumes literacy to constitute a continuum. Therefore, this study seeks to profile Mississippians' literacy across a range of skills. Thus, literacy scores rather than literacy categories are stressed.

Modern perspectives on literacy also differentiate between types of skills that are included under the rubric of literacy. Traditional discussions have focused on the reading of prose as the essential skill required to be considered literate. As society has demanded more diversified skills, the concept of

literacy has been broadened to include additional skill dimensions beyond the type of reading normally associated with classroom work. There is a growing realization that workplace skills are quite different from classroom skills and that workplace skills need to be included in the definition of literacy. Kirsch and his colleagues differentiate between three skills that compose literacy. These skills are the effective use of (1) prose, (2) documents, and (3) quantitative materials. This perspective implies that measurement devices that can profile individuals on literacy continua across several dimensions are needed.

Notions about literacy requirements can be tied closely to the skill requirements of a society at a particular point in time. In the nineteenth century, an individual who could read simple prose and sign his name would have been considered to have good literacy skills for most occupations. Today those same skills would be considered inadequate in most work settings since today's occupations require the use of technical documents and quantitative materials. The emergence of the term "computer literate" captures the changing societal demands that shape our notions about literacy skills. In this context, literacy is, in some respects, a moving target. What is literate today may not be literate tomorrow because societal needs are apt to change the content of literacy skills. While the notion of literacy as a multidimensional concept that can be measured along a series of continua will not necessarily handle the social change aspect of literacy, it does seem to be an improvement over simpler measures. As literacy skills change, we may be able to capture

this change by shifting levels of literacy requirements along currently identified continua (prose, documents, and quantitative skills) or by the addition of new dimensions (e.g., computer literacy).

Imbedded in the foregoing discussion is the linkage between societal demands and literacy levels. If we add the additional element of adequacy between societal needs and literacy skills, the concept of functional literacy can be structured. Much of the current discussions about literacy use this concept in some fashion. It implies that certain levels or ranges or profiles of literacy are required for an individual to function in society. While such a notion has a great many advantages since it combines the important elements of societal need, individual literacy skills, and adequacy, it also has one severe limitation. There are many individuals in society whose literacy skills are so minimal that they would never be classified as functionally literate. Yet these same individuals function quite successfully in society both as workers and citizens. These individuals, of course, have developed a range of coping skills and interdependence with others who are literate that allow them to function successfully. One must wonder, however, what their level of accomplishment would have been had their literacy skills been more substantial. While this limitation of the functional literacy concept is not overwhelming, it should caution us to remember that many functioning individuals may not be "functionally literate."

The term "functionally illiterate" encompasses a broad spectrum of adults, ranging from those who cannot read the instructions on a medicine bottle or look up a number in the telephone book to adults who cannot fill out a job application or adapt to new technology in the workplace. Adult functional literacy education focuses on a continuum of life skills ranging from little or no ability to read and write to high levels of reading, writing, communicating, and problem-solving skills. Today's definition of "literacy" is contextual, changing to meet the requirements of family, workplace and community life....

-Governor's Office for Literacy, State of Mississippi

The subsequent sections of this report present a great deal of information about literacy in Mississippi based on the analysis of the Mississippi Literacy Assessment data. Section 2 provides a profile of literacy in Mississippi based on four literacy scales: NAEP reading, prose, document, and quantitative. Section 3 reports on results of a modeling effort that attempts to project literacy scores for each Mississippi county. Section 4 provides a series of comparisons of literacy proficiency among major demographic and social groups. Section 5 focuses on literacy in the workplace. The final chapter presents sets of major findings and discusses the implications of the literacy assessment.

ENDNOTES TO SECTION 1

[1]The Southern Regional Literacy Commission is an organization fostered by the Southern Growth Policy Board. The Commission adopted "Literacy is Everybody's Business" as the title for their final report. Doris Betts and Robert Donnan, *Literacy is Everybody's Business*, (Research Triangle Park: PBM Graphics Inc., n.d. [1990]).

[2]The South has long been cited as a literacy "trouble spot." For a discussion of early 20th century southern efforts, see James E. Akerson, "The Southern Literacy Campaign 1910-1935: Lessons for Adult Learning in an Information Society," paper presented at the National Adult Education Conference, (Louisville, Kentucky, 1984).

[3]For an overview of the project goals and research design, see Arthur G. Cosby and Maxie P. Kohler, "The Mississippi Literacy Assessment: A Proposal for Comprehensive Survey of Adult Literacy," (Mississippi State: Social Science Research Center, November 1989).

[4]An overview of the research methods for the Mississippi Literacy Assessment has been prepared by Frank M. Howell and Keith Rust and appears as an appendix to this report.

[5]The Mississippi Literacy Assessment project has a public user file and data code book which can be used by researchers who desire to conduct secondary analysis of the data collected in the study.

[6]Irwin S. Kirsch and Ann Jungeblut, *Literacy: Profiles of America's Young Adults*, Report Number 16-PL-02, (Princeton: Educational Testing Service, 1986.)

[7]Richard L. Venezky, Daniel A. Wagner, and Barrie S. Ciliberti, ed., *Toward Defining Literacy*. (Newark, Delaware: International Reading Association, 1990.)

Section 2. Measuring Adult Literacy in Mississippi

The measurement approach utilized in the Mississippi Literacy Assessment relies on recent advances in adult literacy research lead by scientists at the Educational Testing Service (ETS), Princeton, New Jersey. Irwin Kirsh and his colleagues have taken substantial strides in the concept development, instrument design, and scaling protocol necessary to adequately assess adult literacy proficiency. The Mississippi Literacy Assessment measurement approach borrows heavily from this body of research by adopting the general ETS measurement design. Assessment booklets, response scoring, and literacy scales were provided by ETS through a cooperative agreement with Mississippi State University. It appears that ETS's approach will be the dominant measurement model for adult literacy studies for the next decade. Plans are underway to use this measurement model in the forthcoming National Adult Literacy Survey. The utilization of this instrumentation will allow the establishment of baseline data which can be used not only to judge improvement in the literacy of the state, but also to contrast proficiency

differences between Mississippi and other states as well as Mississippi and the nation as a whole.

The ETS assessment approach relies on respondent performances on over 100 literacy tasks.[1] The majority of these tasks are simulation exercises that are designed to measure a wide range of "real world" information processing capabilities. Simulation tasks included such items as "locating information in a newspaper," "interpreting appliance warranty information," "orally interpreting a new story," "locating the time of a meeting from a form," "enter information on a job form," "balancing a checkbook," and "determining interest on a loan from an ad." The use of simulation items is thought to more readily capture "functional literacy" activities relevant to adult communities, workplace, and family life. These simulation items provide the basis for the subsequent development of prose, document, and quantitative literacy scales. The ETS approach also has a set of multiple choice exercises. These items were used to develop a NAEP (reading) scale which is essentially an "in school" literacy measure of reading. The NAEP (reading) scale provides a means of linking the performance of adults with "in school" population. Following ETS's lead, the Mississippi Literacy Assessment has literacy scores available for both the simulation of functional activities and the NAEP (reading) items. Information from the NAEP (reading) scale will be presented first.

NAEP's Five Levels of Reading Proficiency

RUDIMENTARY (150)

*Readers who have acquired rudimentary reading skills and strategies can follow brief written directions....Performance at this level suggests the ability to carry out simple, discrete reading tasks.**

BASIC (200)

*Readers who have learned basic reading comprehension skills and strategies can locate and identify facts from simple informational paragraphs, stories, and news articles....Performance at this level suggests the ability to understand specific or sequentially related information.**

INTERMEDIATE (250)

*Readers with the ability to use intermediate skills and strategies can search for, locate, and organize the information they find in relatively lengthy passages and can recognize paraphrases of what they have read.... Performance at this level suggests the ability to search for specific information, interrelate ideas, and make generalizations.**

ADEPT (300)

*Readers with adept reading comprehension skills and strategies can understand complicated literacy and informational passages, including materials about topics they study at school.... Performance at this level suggests the ability to find, understand, summarize and explain relatively complicated information.**

ADVANCED (350)

*Readers who use advanced reading skills and strategies can extend and restructure the ideas presented in specialized and complex texts. Examples include scientific materials, literary essays, historical documents, and materials similar to those found in professional and technical working environments.... Performance at this level suggests the ability to synthesize and learn from specialized reading materials.**

**Irwin Kirsch and Ann Jungeblut, Literacy: Profiles of America's Young Adults, 1986.*

Table 2.1 provides an overview of literacy proficiency as indicated by NAEP (reading) scores. Estimates are provided for Mississippi adults at the Rudimentary (150), Basic (200), Intermediate (250), Adept (300), and Advanced (350) levels of literacy proficiency. The percentage data is presented in cumulative form. For example, the table indicates that 7.3% of the adult population can read at the Advanced Level (a score of 350 and above). The corresponding population figure is a weighted estimate of the actual number of adult Mississippians who perform at this level (Advanced Level = 144,362). About 30% of the sample scored at the Adept level (300 and above) and about 65% received scores at the intermediate level (250 and above). An examination of the data at the lower range of reading proficiency suggests that practically all Mississippians (98%) have rudimentary reading skills and that most (91%) are performing at the basic skills level. These findings might be interpreted to mean that the literacy skills of Mississippians are somewhat better than originally thought.

The interpretation of the NAEP (reading) results as indicative of higher than expected literacy proficiency should be made with caution. Such a finding is not consistent with either conventional wisdom or with the results of research based on traditional measures of literacy (e.g., education levels). It is interesting to note that the NAEP (reading) scores obtained in the Young Adult Study were substantially higher for that sample than the comparable

TABLE 2.1

Percentage of Adult Mississippians Who Score at or above Select Points on the NAEP (Reading) Scale

Scores	Percent[a]	Population[b]
Advanced (350 and above)	7.3 (0.7)	144,362
Adept (300 and above)	30.3 (1.5)	599,202
Intermediate (250 and above)	65.1 (1.5)	1,287,394
Basic (200 and above)	90.8 (1.0)	1,795,628
Rudimentary	98.4 (0.5)	1,945,922

[a]Numbers in parentheses are standard error estimates.
[b]Weighted population estimates.

figures for the Mississippi Literacy Assessment. It should be recalled that this comparison must be made carefully since a comparison of a national young adult sample (age 21-25) is being made to a state, cross-sectional adult sample (age 16-75). In the NAEP Young Adult Study, 20.9% of the young adults obtained scores at the Advanced level (350 or above), while in the Mississippi study only 7.3% of the adults scored at this level. Comparable figures were also obtained at the Intermediate level; the NAEP young adults' percentage was 84.1% while the Mississippi estimate was 65.1%. At the lower end of the scale, 96.8% of the NAEP sample as compared to 90.8% of the Mississippi sample scored at the Basic level or above. Also, 99.6% of the NAEP sample and 98.4% of the Mississippi sample scored at the Rudimentary level or above. This comparison leads to two general observations. First, in view of these young adult scores, Mississippi NAEP estimates do not seem especially high. Second, in both the NAEP Young Adult sample and the Mississippi sample of adults, the NAEP score did not seem especially effective in discriminating between literacy proficiency in the lower range of skill levels. Almost everyone was judged to have rudimentary skills in both studies.

The ETS scaling method produces scores for three types of adult skills that are more consistent with the concept of "functional literacy" - prose literacy, document literacy, and quantitative literacy. Each of these three scales has potential values of 0-500. In Table 2.2, there is a set of estimates

> ***In this assessment, the criterion for success was 80 percent probability. This means that individuals estimated to be at a given level on the scale of consistently -- that is, with 80 percent probability -- perform tasks like those used to illustrate performance at that level. Individuals at lower levels on the scale also have a chance of successfully performing the more difficult tasks, but their probability of success is considerably lower than 80 percent and, thus, one has much less confidence that they will perform the more difficult tasks consistently.***
>
> *--Irwin Kirsch and Ann Jungeblut, Literacy: Profiles of America's Young Adults 1986.*

that provides the prose literacy skills of Mississippi adults. The table can be read as follows:

1) The Items column gives examples of list items and their scale value; e.g., the item "Interpret instructions from an appliance warranty" has a scale value of 279.

2) A person whose prose score is 279 would have an 80% probability of correctly responding to that item.

3) This same individual would have a lower than 80% probability of responding correctly to items with difficulty levels greater than 279, and the same individual would have a higher probability of responding correctly to less difficult items.

4) The selected scores are arbitrary benchmarks that help orient the prose scale; e.g., the value of 300 has a reported percentage of 28.6%. The interpretation is that 28.6% of adult Mississippians had an 80% probability of responding at the 300 or greater score level.

5) The numbers in parentheses are estimates of the standard error.

6) The population figure is a weighted estimate of the number of Mississippians who scored at or above a given skill level; e.g., at the 350 prose level, 150,295 Mississippians scored at or above the 350 level.

Table 2.2 shows the percentages of adult Mississippians scoring at or above selected points on the prose scale. Of the total number of respondents, 80 percent scored at or above the 200 level. Higher up on the prose literacy scale, scores decreased as the difficulty of the assignments increased. The most noticeable break in proficiency occurred between the selected scores of 275 and 300. The sample item listed on Table 2.2 is "Write letter to state that an error has been made in billing." At this level, 42.7 percent of respondents answered correctly. At the 300 level, "Locate information in a news article," the correct response rate dropped to 28.6 percent. At the top of the scale, 2.5 percent of the sample performed at or above the 375 level. The estimate increased to 7.6 percent at the 350 or above level.

Prose

200 Level Prose Literacy: 80.0% of Adults (N=1,582,050)

*Two tasks characteristic of performance at the 200 level on the prose literacy scale are: writing a simple description of the type of job one would like to have (199), and accurately locating a single piece of information (single feature match) from a newspaper article of moderate length (210)....**

275 Level Prose Literacy: 42.7% of Adults (N=844,420)

*Tasks characteristic of performance at the 275 level include writing a letter to explain that an error has been made in a billing charge (277); generating the theme of a poem containing numerous allusions to a familiar theme - war (278); and, interpreting the instructions from an appliance warranty to select the most appropriate description of what is wrong (279).**

325 Level Prose Literacy: 15.7% of Adults (N=310,477)

*Bracketing the 325 level are tasks requiring the reader to locate information on the basis of three features (313) that are repeated throughout a lengthy news article or to synthesize the main argument from a lengthy newspaper column (340)....**

375 Level Prose Literacy: 2.5% of Adults (N=49,439)

*Tasks bracketing the 375 level on the prose scale require the reader to use text information to describe orally the distinctions between two types of employee fringe benefits (371) and to generate unfamiliar themes from a short poem (387)....**

* *Irwin Kirsch and Ann Jungeblut, Literacy: Profiles of America's Young Adults 1986.*

When comparing the prose scores of the white and black population within Mississippi, one immediately sees a marked difference. At the most basic level of 150, virtually all of the white population responded correctly to the task (98.0 percent). The black population had a success rate of 85.9 percent, a difference of 12.1 percent. Continuing up the table to the 200 level, 88.8 percent of the white population could "Locate information in a sports article" while only 62.1 percent of blacks could perform the same task. At the selected score of 275, the success rate of whites dropped significantly to 55 percent, but even more profound was the decrease in black proficiency to a low 17.9 percent. At the 300 level, 38.5 percent of the white population completed the assigned task, while only 9.2 percent of the black population was successful. At the highest point completed successfully by both whites and blacks (375), 4 percent of whites answered correctly with only .1 percent of blacks performing similarly. Comparing the black segment of the respondents to the total number of respondents is especially revealing. At the 275 level, 42.7 percent of the total respondents answered correctly while just 17.9 percent of black respondents answered correctly.

As Table 2.2 indicates, there is also a pronounced difference in prose literacy scores among the various levels of educational attainment. Of those with eight or fewer years of schooling, 69.3 percent scored the lowest measurable level of 150. At this level, 94.9 percent of respondents with 9-12

years of school, 97.6 percent of high school graduates, and 99.7 percent of college graduates were able to perform successfully. Respondents with 0-8 years of schooling topped out their correct responses at the selected score of 325. At this level, 42.2 percent of college graduates were still answering correctly. At the 350 level there was a substantial difference between the correct response rate of high school (4.6 percent) and college (24.8 percent) graduates. At 375, 11.1 percent of college graduates performed the task successfully, with less than 3 percent of respondents from the other educational levels performing comparably.

As in the National Young Adult Survey, the Mississippi Literacy Assessment measured individuals' abilities to use documents. These documents were presented in various formats including charts, bus schedules, deposit slips, maps, labels, television guides, job applications, order forms, paycheck stubs, and indexes.[2] Like the prose scale seen in Table 2.2, the difficulty of the assigned tasks increased moving from the bottom of the table to the top.

TABLE 2.2

Percentage of Adult Mississippians Who Scored At or Above Selected Points on the Prose Scale

Items[a]	Selected Scores	Total[b]	Population[c]
Identify appropriate information in lengthy newspaper column (397)	500	.	.
Select inappropriate title based on interpretation of news article (361)	375 350	2.5 (.5) 7.6 (.6)	49,439 150,295
State in writing argument made in lengthy newspaper column (340)			
Locate information in a news article (313)	325 300	15.7 (1.0) 28.6 (1.4)	310,477 565,583
Locate information on a page of text in an almanac (3 feature) (281)			
Interpret instructions from an appliance warranty (279)			
Generate familiar theme of poem (278)			
Write letter to state that an error has been made in billing (277)	275	42.7 (1.6)	844,420
Locate information in sports article (2 feature) (262)	250 225	57.5 (1.5) 70.2 (1.3)	1,137,099 1,388,250
Locate information in sports article (1 feature) (210)	200	80.0 (1.1)	1,582,051
Write about a job one would like (199)	175 150 0	88.4 (1.1) 94.1 (.8)	1,748,166 1,860,887

TABLE 2.2, continued

Items[a]	Selected Scores	White[b]	Black[b]
Identify appropriate information in lengthy newspaper column (397)	500		
Select inappropriate title based on interpretation of news article (361)	375 350	4.0 (.7) 11.3 (.8)	.1 (na) .5 (.3)
State in writing argument made in lengthy newspaper column (340)			
Locate information in a news article (313)	325 300	22.2 (1.1) 38.5 (1.4)	3.1 (.8) 9.2 (1.6)
Locate information on a page of text in an almanac (3 feature) (281)			
Interpret instructions from an appliance warranty (279)			
Generate familiar theme of poem (278)			
Write letter to state that an error has been made in billing (277)	275	55.0 (1.5)	17.9 (2.0)
Locate information in sports article (2 feature) (262)	250 225	68.9 (1.6) 80.4 (1.2)	34.3 (2.4) 49.4 (2.4)
Locate information in sports article (1 feature) (210)	200	88.8 (1.4)	62.1 (2.2)
Write about a job one would like (199)	175 150 0	95.2 (.7) 98.0 (.5)	74.6 (2.3) 85.9 (2.1)

TABLE 2.2, continued

Items[a]	Selected Scores	0-8[b] Education	9-12[b] Education	HS[b] Education	> HS[b] Education	College[b] Grad.
Identify appropriate information in lengthy newspaper column (397)	500	-	-	-	.2(na)	-
Select inappropriate title based on interpretation of news article (361)	375 350	- -	.1(na) .9(.5)	.8(.4) 4.6(.9)	2.7(1.0) 10.2(1.7)	11.1(2.0) 24.8(2.2)
State in writing argument made in lengthy newspaper column (340)						
Locate information in a news article (313)	325 300	1.7(.9) 3.6(1.4)	3.4(.9) 11.6(2.2)	10.3(1.1) 23.3(2.0)	23.6(2.5) 42.9(2.3)	42.2(2.8) 60.9(2.6)
Locate information of a page of text in an almanac (3 feature) (281)						
Interpret instructions from an appliance warranty (279)						
Generate familiar theme of poem (278)						
Write letter to state that an error has been made in billing (277)	275	5.3(1.5)	21.0(2.5)	41.2(2.5)	61.7(2.4)	77.6(2.1)
Locate information in sports article (2 feature) (262)	250 225	10.1(2.1) 21.7(3.0)	33.3(3.6) 52.7(2.3)	61.5(2.6) 77.3(2.2)	80.3(2.1) 89.5(1.7)	88.3(2.0) 93.3(1.7)
Locate information in sports article (1 feature) (210)	200	32.6(3.3)	68.5(2.3)	88.5(1.5)	95.3(1.1)	97.9(.9)
Write about a job one would like (199)	175 150 0	51.1(3.6) 69.3(4.0)	84.9(1.8) 94.9(1.1)	94.8(1.1) 97.6(.7)	98.4(.8) 100.0(na)	99.4(.4) 99.7(.3)

[a]Item number in parentheses refer to a proficiency level; an individual with that score has an 80 percent probability of responding correctly to that task.
[b]Number in parentheses is the standard error.

Document

150 Level Document: 91.9% of Adults (N=1,817,381)

*Tasks breaking the 150 level of proficiency include signing one's name on the social security card (110), locating the expiration date on a driver's license (160), and identifying the correct time of a meeting from a form (169). The distinguishing characteristic in these latter two tasks appears to be that the information is not derived from personal background knowledge. Otherwise, each of these two tasks requires the reader to match a single feature of information that is given in both the question and the document.**

200 Level Document: 79.1% of Adults (N=1,564,253)

*Tasks around this level of proficiency require the reader to engage in successive one-feature matching. For example, one question directs the reader to match money-saving coupons to a shopping list of several items (211). A slightly easier task involves entering personal background information on a job application (196). Also at about this level, we see the first task requiring a two-feature match - the reader is directed to circle the movie that comes on a particular channel at a specified time (192).**

**Irwin Kirsch and Ann Jungeblut, Literacy Profiles of America's Young Adults, 1986.*

250 Level Document: 54.5% of Adults (N=1,073,772)

*Tasks estimated to be at about the 250 level involve matching information on the basis of two features from documents containing several distractors or plausible answers. One such task involves locating in a table how soon an employee will be eligible for a particular type of fringe benefit (262). Another task at about this level involves locating a particular intersection on a street map (249).**

300 Level Document: 26.2% of Adults (N=510,122)

*At this and higher levels of difficulty, the reader is asked to match information on the basis of increasing numbers of features. In some cases these are literal, while in others the matching is based on information that might be stated one way in the question and another in the document. Also common to these tasks is the increase in the number of distractors contained in the document. Examples of tasks having these characteristics are: identifying information contained in a graph depicting the source of energy, the year of consumption, and the percentage of use (294); and, looking up the appropriate kind of sandpaper to use from a chart depicting various types of use, grades, and materials to be sanded (320). Another type of task involves doing successive two-feature matching. This task requires the reader to follow directions using a street map to travel from one location to another (300).**

**Irwin Kirsch and Ann Jungeblut, Literacy Profiles of America's Young Adults, 1986.*

To paraphrase the findings of the National Young Adult Study in the realm of the document scale, task difficulty rises as:

i) there is an increase in the features or categories within the document which the respondent has to locate;

ii) the number of possible correct answers in the document escalates (that is, additional pieces of information may confuse the reader); and,

iii) the question and the answer within the document are not as easily identified with each other.

In Table 2.3, 91.9 percent of the total number of respondents in the Mississippi Literacy Assessment were able to function at the selected score of 150. The task listed at the 160 level was to "locate expiration date on driver's license." At the 200 level, the percent of correct responses dropped to 79.1 percent. The task listed as 211 on the scale was to "match items on shopping list to coupons."

Proceeding up the scale to 250, 54.5 percent of respondents answered correctly. Less than 40 percent of respondents were able to correctly use an index from an almanac (level 275). At the selected score of 325, only 14.3 percent of respondents gave the correct answer. The highest score of 375 saw 2.2 percent of the adults surveyed responding correctly.

TABLE 2.3

Percentage of Adult Mississippians Who Scored at or above Selected Points on the Document Scale

Items[a]	Selected Scores	Total[b]	Population[c]
Use bus schedule to locate appropriate bus for given departures and arrivals (365,343,334)	500	-	-
	375	2.2(.4)	43,506
	350	6.5(.6)	128,542
Use sandpaper chart to locate appropriate grade given specifications (320)	325	14.3(1.1)	282,792
Follow directions to travel from one location to another using a map (300)	300	26.2(1.6)	518,122
Use index from an almanac (278)	275	39.8(1.9)	787,070
Locate eligibility from table of employee benefits (262)			
Locate gross pay-to-date on pay stub (257)			
Complete a check given information on a bill (255)	250	54.5(1.9)	1,077,772
Locate intersection on street map (249)			
Enter date on a deposit slip (221)	225	68.2(1.7)	1,348,698
Match items on shopping list to coupons (211)	200	79.1(.4)	1,564,253
Enter personal information on job application (196)			
Locate movie in TV listing in newspaper (192)	175	86.9(1.1)	1,718,503
Locate time of meeting on a form (169)			
Locate expiration date on driver's license (160)	150	91.9(.9)	1,817,381
Sign your name (110)	0		

TABLE 2.3, continued

Items[a]	Selected Scores	White[b]	Black[b]
Use bus schedule to locate appropriate bus for given departures and arrivals (365, 343,334)	500	.	.
	375	3.2 (.5)	.1 (.2)
	350	9.4 (1.0)	.3 (.4)
Use sandpaper chart to locate appropriate grade given specifications (320)	325	20.0 (1.2)	2.4 (.8)
Follow directions to travel from one location to another using a map (300)	300	36.5 (1.8)	4.9 (1.1)
Use index from an almanac (278)	275	52.8 (1.7)	12.4 (1.9)
Locate eligibility from table of employee benefits (262)			
Locate gross pay-to-date on pay stub (257)			
Complete a check given information on a bill (255)	250	66.9 (1.8)	28.1 (2.3)
Locate intersection on street map(249)			
Enter date on a deposit slip (221)	225	79.8 (1.6)	43.5 (2.8)
Match items on shopping list to coupons (211)	200	88.5 (1.1)	59.1 (3.0)
Enter personal information on job application (196)			
Locate movie in TV listing in newspaper (192)	175	94.4 (.7)	71.1 (2.9)
Locate time of meeting on a form (169)			
Locate expiration date on driver's license (160)	150	97.3 (.5)	80.5 (2.2)
Sign your name (110)	0		

TABLE 2 3, continued

Items[a]	Selected Scores	0-8[b] Education	9-12[b] Education	HS[b] Education	> HS[b] Education	College[b] Grad.
Use bus schedule to locate appropriate bus for given departures and arrivals (365,343,334)	500 375 350	. . .1(na)	. . .5(.4)	. .8(.4) 2.8(.8)	. 1.8(.6) 8.7(1.3)	. 10.0(1.9) 22.8(2.2)
Use sandpaper chart to locate appropriate grade given specifications (320)	325	.5(0.0)	1.8(.8)	8.9(1.3)	21.1(2.3)	41.1(2.6)
Follow directions to travel from one location to another using a map (300)	300	.5(na)	6.9(1.5)	20.9(2.1)	40.0(3.1)	61.8(3.2)
Use index from an almanac (278)	275	3.3(1.1)	14.5(2.1)	38.2(2.6)	59.9(3.1)	76.1(2.3)
Locate eligibility from table of employee benefits (262)						
Locate gross pay-to-date on pay stub (257)						
Complete a check given information on a bill (255)	250	8.1(2.0)	27.6(3.3)	60.8(2.5)	75.8(2.7)	85.6(2.1)
Locate intersection on street map (249)						
Enter date on a deposit slip (221)	225	18.2(3.5)	49.7(3.6)	74.8(2.0)	88.8(1.8)	93.0(1.9)
Match items on shopping list to coupons (211)	200	29.2(4.6)	66.8(3.0)	87.4(1.6)	96.3(.9)	97.0(1.3)
Enter personal information on job application (196)						
Locate movie on TV listing in newspaper (192)	175	48.7(4.7)	79.6(2.4)	94.1(1.1)	97.6(.8)	100(na)
Locate time of meeting on a form (169)						
Locate expiration date on driver's license (160)	150	61.4(4.1)	89.7(1.6)	97.5(.6)	98.9(1.6)	100(na)
Sign your name (110)	0					

[a]Item number in parentheses refers to a proficiency level; an individual with that score has an 80 percent probability of responding correctly to that task.
[b]Number in parentheses is the standard error.

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Comparing the document interpretation abilities of the white and black respondents to the Mississippi Literacy Assessment proved as significant as the results in the prose category. While 97.3 percent of whites responded correctly at the most basic 150 level, 80.5 percent of blacks successfully performed the same types of tasks. The differences in the black and white population continue to reveal themselves as the document complexity increases. At the 250 level where respondents were asked to "complete a check given information on a bill," there was a 38.8 percent greater success rate among whites. Whites also performed substantially better at the selected score of 275 with a 40.4 percent higher correct response rate than blacks. At 325, the white respondents answered correctly 3.2 percent of the time, while only .1 percent of blacks answered correctly.

At the 150 level, the proficiency of blacks is 16.8 percent lower than whites. As the degree of difficulty increases, the correct response rates among the black population decrease in greater percentages than in the white population. For example, from levels 175 to 200, white proficiency dropped 5.9 percent while black proficiency went down by 12 percent. These differences diminished at the upper levels of the document scale.

Document proficiency was also dependent upon educational attainment. Of respondents with eight or fewer years of schooling, just 61.4 percent could

perform at the 150 level. At the selected score of 175, those who had not received their high school diplomas but who had some high school education were completing 79.6 percent of these tasks correctly. High school graduates had a success rate of 94.1 percent at the same level. By the 200 level there were distinct differences among those with some high school, high school graduates, those with some college education, and college graduates. There was about a 10 percent difference between high school graduates and college graduates at this selected score. At the 250 level, 8.1 percent of respondents with 0-8 years of schooling answered correctly compared with 60.8 percent of high school graduates and 85.6 percent of college graduates. The selected score of 275 served to further separate respondents' success rates. Here, 76.1 percent of college graduates performed the task correctly compared to 59.9 percent of those with some college, 38.2 percent of high school graduates, 14.5 percent of those with some high school, and 3.3 percent of those with only grade school education or less. At the 375 level which required respondents to "use bus schedule to locate appropriate bus for given departures and arrivals," 10 percent of college graduates performed the task correctly.

The quantitative scores for the Mississippi Literacy Assessment are seen in Table 2.4. These percentages are indicative of respondents' abilities to perform mathematics using addition, subtraction, multiplication, and division. (Again, these are similar to the requirements in the National Young Adult

Study.) The tasks included operations ranging from calculating bank deposits to determining a tip at a restaurant to determining the amount of interest charges on a loan. Overall, Mississippians were more likely to respond correctly to the quantitative tasks than to the prose or document assignments. At the selected score of 375, for example, the percentages for correct respondents were 2.5 for prose, 2.2 for documents, and 4.4 for quantitative. At 275, the figures indicate correct responses to be 42.7 percent for prose, 39.8 percent for documents, and 48.4 percent for quantitative. On the quantitative scale, the greatest proficiency drops come between the levels of 250 and 300.

As with the prose and document scales, there is a considerable discrepancy between the literacy skills of the white and black populations in Mississippi. At the lowest level (150) there is a difference of almost 10 percent. At the level where respondents had to figure a "total bank deposit entry" (233), 86 percent of whites performed the task successfully while only 46.9 percent of blacks were able to do so. At the selected score of 275, 46 percent more whites than blacks were able to answer correctly. On the quantitative scale at 300, 7.4 percent of the blacks surveyed were successful in performing the tasks; 45.9 percent of white respondents answered correctly. At the highest score of 375, 6.5 percent of whites surveyed performed the given tasks, with only .2 percent of blacks making the correct response.

Quantitative

225 Level Quantitative: 73.4% of Adults (N=1,451,532)

*The task that best typifies the lowest level on the quantitative scale requires totalling two entries on a bank deposit slip (233).**

275 Level Quantitative: 39.8% of Adults (N=957,141)

*Tasks estimated to be slightly above the 275 level involve entering deposits and checks and balancing a checkbook. These range from 281 to 293.**

325 Level Quantitative: 19.8% of Adults (N=391,558)

*A task typical of performance at the 325 level requires the reader to examine a menu to compute the cost of a specified meal and to determine the correct change from a specified amount (337). The difficulty of such tasks reflects the need to match information and then to apply two operations in sequence.**

375 Level Quantitative: 4.4% of Adults (N=87,013)

*One task that typifies performance at the 375 level requires the reader to use a page from a catalogue to fill out an order form, calculate the cost for a number of items, and total the cost (371). Another task presents unit pricing information similar to that found in a grocery store; the reader is required to select the least costly product (376).**

**Irwin Kirsch and Ann Jungeblut, Literacy: Profiles of America's Young Adults, 1986.*

TABLE 2.4

Percentage By Race and Education of Adult Mississippians At or Above Selected Points on the Quantitative Scale

Items*	Selected Scores	Total*	Population*
Determine amount of interest charges from loan ad (489)	500		
Estimate cost using grocery unit-price labels (376)	375	4.4(.6)	87,013
Calculate & total costs based on item costs from catalogue (371)			
Determine tip given percentage (356)	350	10.2(.9)	201,711
Plan travel arrangements for meeting using flight schedule (340)			
Determine correct change using menu (337)	325	19.8(1.2)	391,558
	300	33.5(1.5)	662,484
Enter & calculate checkbook balance (293, 289, 281)			
Total bank deposit entry (233)	275	48.4(1.6)	957,141
	250	63.5(1.6)	1,255,753
	225	73.4(1.6)	1,451,532
	200	83.7(1.1)	1,655,221
	175	91.0(1.5)	1,799,583
	150	95.8(.8)	1,894,506
	0		

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TABLE 2.4, continued

Items[a]	Selected Scores	White[b]	Black[b]
Determine amount of interest charges from loan ad (489)	500	-	-
Estimate cost using grocery unit-price labels (376)	375	6.5(.8)	.2(.2)
Calculate & total costs based on item costs from catalogue (371)			
Determine tip given percentage (356)	350	14.7(1.2)	.9(.5)
Plan travel arrangements for meeting using flight schedule (340)			
Determine correct change using menu (337)	325	28.3(1.7)	2.0(.7)
	300	45.9(1.8)	7.4(1.4)
Enter & calculate checkbook balance (293, 289, 281)			
Total bank deposit entry (233)	275	63.2(1.9)	17.2(1.7)
	250	77.2(1.5)	34.8(2.6)
	225	86.0(1.1)	46.9(2.8)
	200	93.5(.8)	63.0(2.3)
	175	97.2(.6)	78.0(2.2)
	150	98.9(.2)	89.4(1.9)
	0		

TABLE 2.4, continued

Items[a]	Selected Scores	0-8[b] Education	9-12[b] Education	HS[b] Education	> HS[b] Education	College[b] Grad.
Determine amount of interest charges from loan ad (489)	500					
Estimate cost using grocery unit-price labels (376)	375			2.6(.6)	6.7(1.3)	13.9(2.7)
Calculate & total costs based on item costs from catalogue (371)						
Determine tip given percentage (356)	350	.9(.6)	1.5(.8)	7.5(1.4)	13.9(1.6)	28.6(2.9)
Plan travel arrangements for meeting using flight schedule (340)						
Determine correct change using menu (337)	325	2.6(1.0)	4.7(1.5)	15.3(1.8)	29.5(2.4)	47.5(3.2)
	300	5.9(1.7)	9.2(1.6)	30.5(2.1)	49.0(2.9)	70.2(2.1)
Enter & calculate checkbook balance (293, 289, 281)						
Total bank deposit entry (233)	275	11.8(2.6)	24.1(3.2)	47.7(2.2)	68.3(2.2)	82.[illegible](2.0)
	250	18.7(3.1)	40.3(4.3)	68.3(2.1)	85.0(2.1)	91.4(2.0)
	225	29.1(3.4)	54.7(4.1)	80.3(1.7)	91.8(1.6)	95.5(1.5)
	200	45.7(4.2)	74.3(2.8)	90.0(1.2)	96.5(1.0)	98.4(.8)
	175	62.2(4.2)	85.8(2.2)	96.8(1.0)	98.8(.7)	100(na)
	150	78.8(3.8)	95.0(1.1)	99.0(.8)	99.7(.3)	100(na)
	0					

[a]Item number in parentheses referred to a proficiency level; an individual with that score has an 80 percent probability of responding correctly to that task.
[b]Number in parentheses is the standard error.

Mississippi adults with 0-8 years of schooling were better able to perform quantitative tasks than prose or document tasks. Correct responses totaled 78.8 percent at the quantitative 150 level compared with 69.3 percent prose and 61.4 percent document. In Table 2.4, we see that individuals with eight or fewer years of schooling performed substantially poorer than even those who had some high school. There is also a jump in ability from those with some high school to respondents who graduated from high school. This wide difference occurs first between the 150 and 200 levels and becomes increasingly evident reading up the table. The major gaps between high school graduates and those with some college or college degrees began within the 225 range. Here, 80.3 percent of high school graduates answered the questions correctly and 95.5 percent of college graduates answered correctly. At 325, 2.6 percent of respondents with 0-8 years of education were able to perform the given tasks. An example of a task in this range was to "determine correct change using menu." (337) At this level, 47.5 percent of college graduates were successful. Respondents with fewer than 12 years of education were unable to perform consistently above the 350 level. High school graduates (2.6 percent), those with some college (6.7 percent), and college graduates (13.9 percent), however, were better able to answer questions in the 375 range.

Tables 2.2, 2.3, and 2.4 provide readers with a basic yet important overview of the abilities of Mississippi adults on the prose, document, and

quantitative scales. As described above, it is highly evident that there is a discrepancy in scores on all three scales in terms of the black and white population of this state. Additionally, the table format shows clearly the strong positive effect of education upon performance on the three scales.

ENDNOTES TO SECTION 2

[1]Irwin S. Kirsch and Ann Jungeblut, *Literacy: Profiles of America's Young Adults*, Report Number 16-PL-02. (Princeton: Educational Testing Service, 1986.)

[2]*Ibid.*

Section 3. Literacy Projections for Mississippi Counties

The purpose of this section is to report on a modeling effort that extends the analysis of the Mississippi Literacy Assessment data to the projection of county literacy proficiency estimates. Local communities have research and assessment needs similar to those of the state and nation. In some respects, the need can be more critical since often the more effective programs and interventions are created, managed, and operated at the local community level. Unfortunately, the cost of conducting research at the community level can be extremely expensive. Funds necessary to collect sufficient data to provide reliable measurement of literacy proficiency for each of Mississippi's 82 counties would be several million dollars.

Local level community-based efforts are the real force in combatting illiteracy. Community organization and volunteers provide us with the manpower, skills, and patience vital to working with people who need to improve their literacy skills.

--Karl Haigler
Special Advisor to the Governor for Literacy
State of Mississippi

Given the expense, it is unreasonable to expect that sufficient resources will be forthcoming to provide community-based, direct measures of adult literacy. Only Oregon and Mississippi have carried out statewide surveys, and neither of these states has a sample sufficient for direct county measurements. In the absence of direct measurements, we are not limited to the traditional use of educational data from the Census as our only source of local literacy estimates. Data from the Mississippi Literacy Assessment do provide an additional option. It is possible to develop a multi-variable regression model for the Mississippi Literacy Assessment sample that can then be used to project literacy estimates to the county level. This effort can be described as "a best available information approach" that provides more information than

simply level of education (as a literacy indicator) but is probably less reliable than direct literacy assessments.

The projection modeling takes advantage of several data sources. While direct estimates of county literacy proficiency are not available, there is a great deal of county information available on other variables. The U.S. Census and other sources routinely collect and report information on counties resulting in a wealth of county data. For example, the Monitor Mississippi Laboratory in the Social Science Research Center at Mississippi State University archives over 20,000 different variables for Mississippi's 82 counties. Of particular interest for this modeling approach is the availability of county-based data on education, race and age. In Table 3.3 , data are reported that reflect county education level (median years of education), race (proportionate non-black), and age (adjusted median age). Based on our knowledge of the relationship between the three variables (education, race and age) and literacy proficiency, it is possible to construct a predictive equation in which literacy proficiency is a function of education, race and age. Substantively, we expect those counties with overall lower levels of education, larger minority populations, and older populations to have, net of other influences, lower levels of literacy proficiency. As already stated, however, the lack of county-based estimates of literacy proficiency does not allow a straight-forward modeling solution.

While the lack of county literacy scores precludes the standard computation of a regression model that uses education, race, and age to predict county literacy proficiency, a similar model can be estimated using data from the Mississippi Literacy Assessment. The assessment data do include measures of education, race and age that are similar to the county level measures. More importantly, the study also has direct measures of prose, document, and quantitative literacy scores. The major difference is that the model based on Mississippi Literacy Assessment data generates individual-level rather than county-level estimates.

$$Y \text{ (Literacy Proficiency)} = \text{Intercept} + b_1 \text{ (Years of Education)} + b_2 \text{ (Race)} + b_3 \text{ (Age)}^2$$

The Mississippi Literacy Assessment data were used to estimate predictive equations for prose, document and quantitative literacy scores. Standard multiple regression techniques were employed which regressed measures of education, race and age on each of the three literacy proficiency scores. The form of the three models was relatively simple. Education and race were modeled as linear effects, while age was modeled as an exponential effect. The selection of an exponential function for age was made because of the curved relationship between literacy and age. The results of this modeling are reported in Table 3.1.

TABLE 3.1

Regression Models For Prediction of Prose, Document, and Quantitative Literacy Proficiency

Prose Literacy Proficiency Projection Model		
Prose Scores = 152.470 + 8.073 Years of Education + 47.186 Race - .010 Age^2		
N=1787	R=.709	R^2=.501
Document Literacy Proficiency Projection Model		
Document Scores = 144.200 + 8.263 Years of Education + 54.148 Race - .012 Age^2		
N=1787	R=.755	R^2=.569
Quantitative Literacy Proficiency Projection Model		
Quantitative Scores = 162.065 + 7.098 Years of Education + 59.259 Race - .008 Age^2		
N=1787	R=.713	R^2=.508

Results from the regression equations indicated that the overall correlation between education, race, and age and literacy scores was relatively strong. Multiple correlation for the three regression equations ranged from a coefficient of R=.709 for prose scores to R=.755 for document scores. Correspondingly, coefficients of determination ranged from R^2=.501 for prose scores to R^2=.569 for document scores, indicating that about one-half of the variations in literacy scores could be associated with (or explained by) the three independent variables. Finally, an examination of standardized beta coefficients (not reported here) revealed that education ranked as the strongest effect on literacy scores, race was ranked as the second strongest, and age was ranked third.

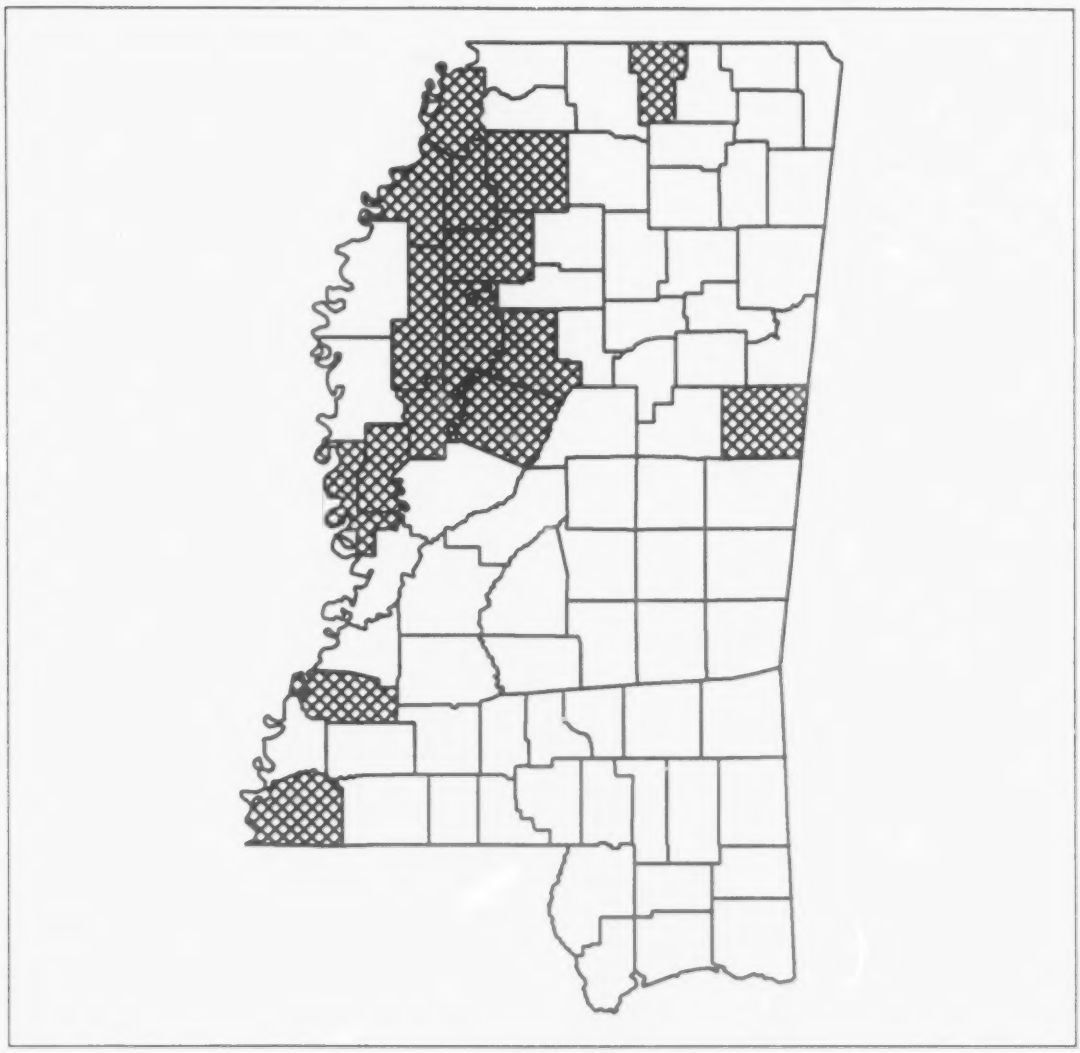
It is intriguing to speculate about the reasons for the strong relationship between literacy proficiency and the variables of education, race, and age. One possible reason is that each of these three indicators serves as a proxy variable for very important clusters of influences that shape society. Years of education provide a rough indicator of formal societal investment in human capital. The race variable (considering that education is controlled) is a rough indicator of discrimination. The age variable can be seen as a measure of developmental and cohort effects. Developmental effects are those associated with the social and biological consequences of maturation and aging. With advancing age, social expectations and physical ability can produce decreased literacy

proficiency. Cohort effects, on the other hand, are the effects of different histories. For example, Mississippians who are over forty-five years of age may have experienced a different quality of education from those who are younger than forty-five. This difference in educational history could result in age cohort effects.

The Mississippi Literacy Assessment derived regression models were then used as prediction equations for the estimation of county level literacy scores. These scores are reported in Table 3.3. The logic of this approach assumes that the same general underlying structure of influences reflected in the model of individual level data would also hold for aggregate county data. The estimation procedure was to take the three equations and enter the equivalent county level estimates for education, race and age. Care was exercised to use similar metrics of measurement. This procedure allowed for the computation of prose, document, and quantitative scores for each Mississippi county.

These estimates are consistent with preconceived notions about literacy in Mississippi. First, counties with comprehensive universities had relatively high scores. Second, counties that have a reputation for economic development (coast counties, suburban counties, and industrial growth counties) tended to have higher scores. Third, poverty counties were found to have the lowest

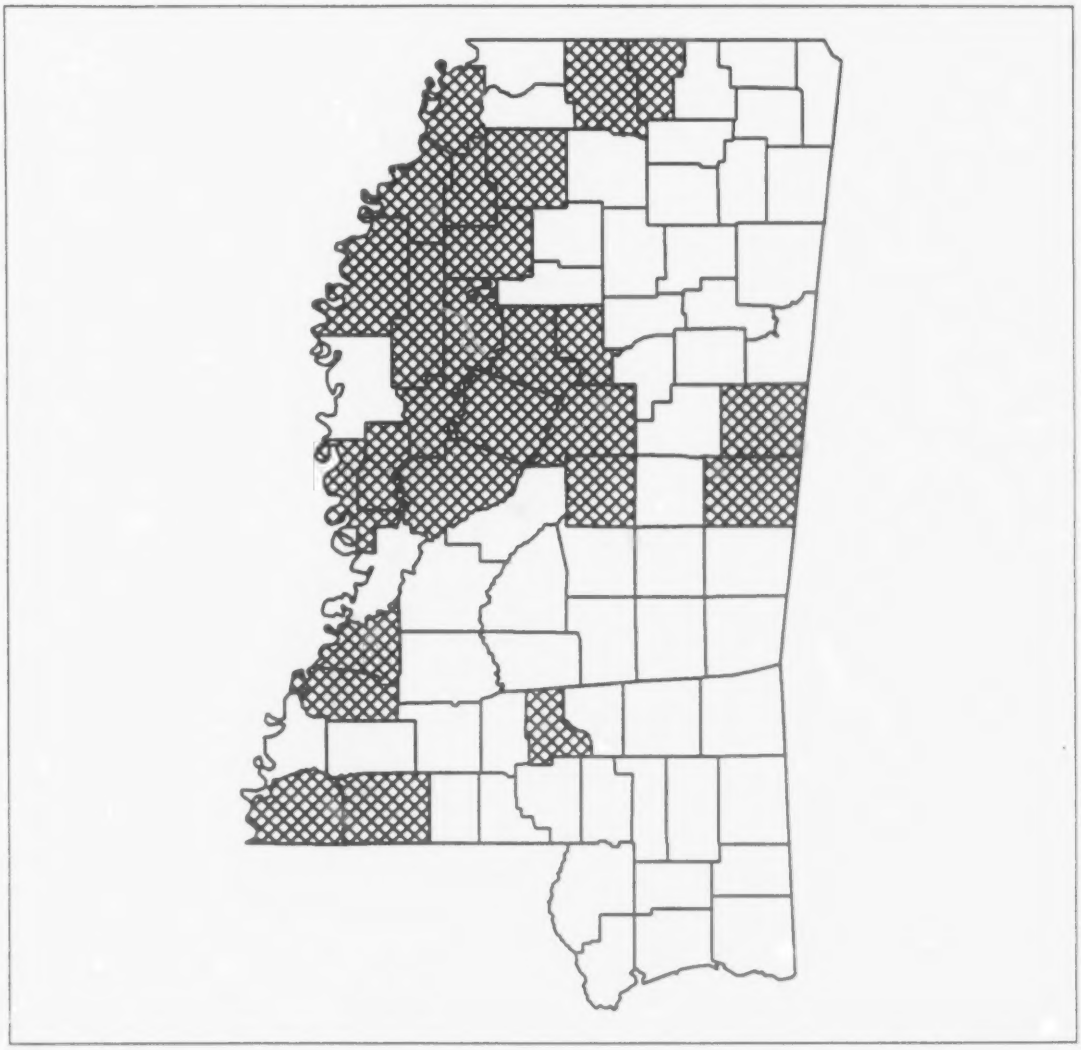
Chart 3.1 Mississippi Counties with Projected Prose Literacy Proficiency of 245 or less



Hatching = Counties with Prose score equal to or less than 245.

Produced by:
Monitor Laboratory
Social Science Research Center
Mississippi State University

Chart 3.2 Mississippi Counties with Projected Prose Literacy Proficiency of 250 or less

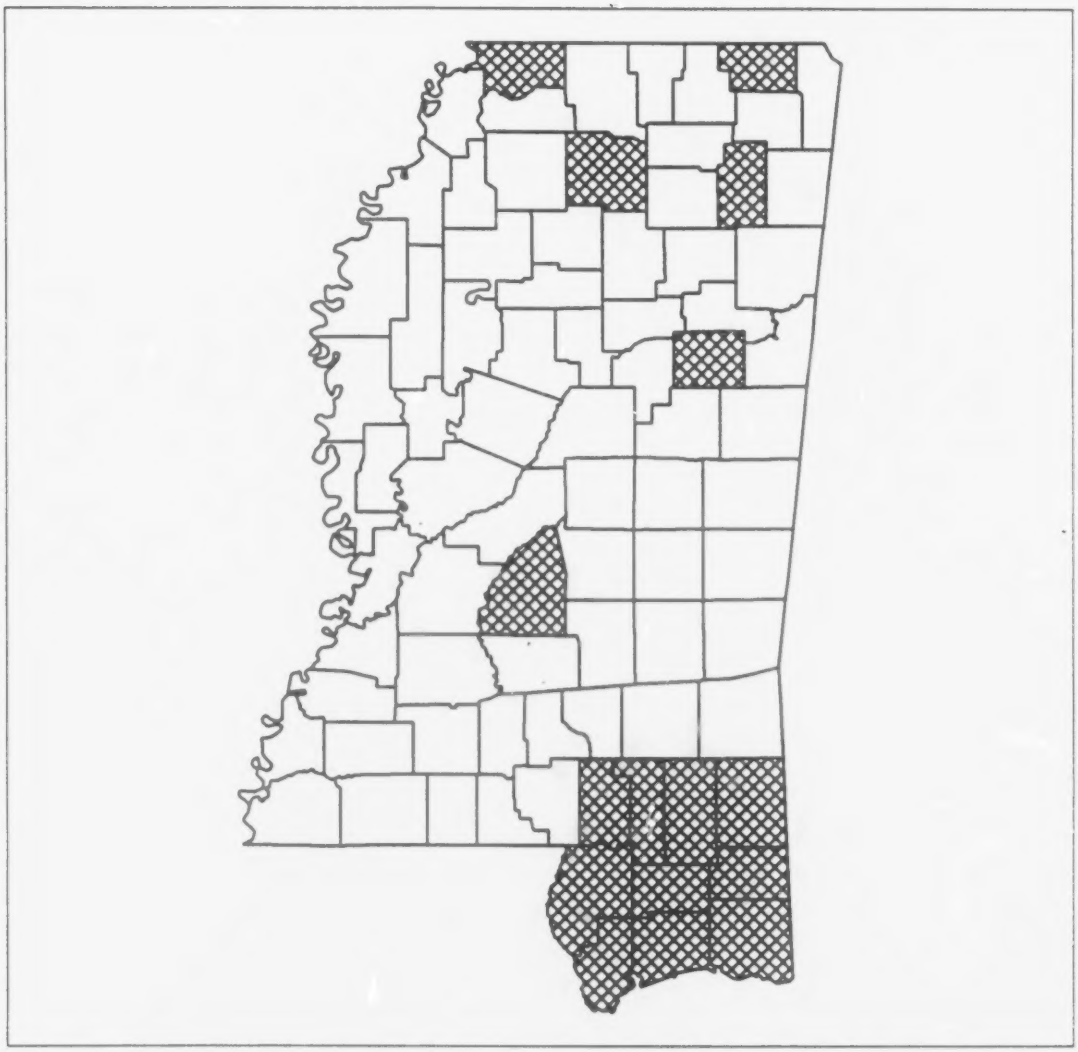


Hatching = Counties with Prose score equal to or less than 250.

Produced by:

Monitor Laboratory
Social Science Research Center
Mississippi State University

Chart 3.3 Mississippi Counties with Projected Prose Literacy Proficiency of 270 or more



Hatching = Counties with Prose score equal to or more than 270.

Produced by:
Monitor Laboratory
Social Science Research Center
Mississippi State University

scores. In Chart 3.1, Mississippi counties with the lowest prose literacy scores have been mapped. Please note the predominance of traditional agricultural-based counties, especially the counties in the Delta region. To a considerable degree, several problems of literacy have a strong geographic dimension in Mississippi.

TABLE 3.2

Comparison of Projected Literacy Scores and Direct Measurement of Literacy Scores for Mississippi

Literacy Scale	Projected[a] Scores	Measured[b,c] Scores (Median)	Difference	Percent Accuracy
Prose	265.2	263.1	+2.1	0.9%
Document	260.5	257.4	+3.1	1.2%
Quantitative	273.2	271.3	+1.9	0.7%

[a]Projected Scores obtained using state level estimates of education, race and age.
[b]Median Literacy Scores for Mississippi as estimated by the Mississippi Literacy Assessment sample.
[c]Measured Means resulted in larger differences in the range of 5 to 7 score points.

The accuracy of the county projections can be assessed further by contrasting scores for the one population that has both a set of projected literacy scores and a set of directly measured literacy scores. That population, of course, is the Mississippi adult population. Table 3.2 provides a contrast of

projected literacy scores derived from the three projection models. These figures are compared to the median levels of literacy obtained from the Mississippi Literacy Assessment sample. The difference should be a rough index of accuracy. In general terms, the projected scores were very close to the sample medians. There was a slight overestimation in each case. The magnitude of the difference ranged from only 1.9 to 3.1 scale points. A similar pattern of results with larger differences was obtained using sample means (differences ranged from approximately 5 to 7 points). The general impression is that the modeling approach reported in this section has produced "reasonable" estimates that may modestly overestimate county levels.

In closing this section, a caveat should be included. County literacy projections are not direct measures and should not be interpreted as constituting actual measurement; rather they should be treated as only suggestive of literacy proficiency at the local community level. The approach has a number of limitations that could adversely affect the reliability of literacy results. Since the approach relies on multiple regression techniques, the assumptions and limitations of regression can influence the results. Also, the approach is based in part on the use of literacy scores that are developed from the complex scaling approach of Item Response Theory. The implications of this technique on the projections are beyond the scope of this report. Special attention needs to be given to possible biases in secondary analysis caused by

use of background variables in the scaling process. Having stated the foregoing limitation, it is our opinion that the projection adds to our understanding of literacy in Mississippi and that the scores have potentially important policy and program implications for the state.

TABLE 3.3

Estimates of Education, Race and Age for Mississippi Counties

COUNTY	MEDIAN YEARS OF EDUCATION	PROPORTIONATE NON-BLACK	ADJUSTED* MEDIAN AGE (ADULT)
Adams	12.2	.51	41.00
Alcorn	11.9	.89	43.40
Amite	10.9	.52	41.80
Attala	10.8	.61	44.60
Benton	9.8	.62	40.50
Bolivar	11.1	.37	36.10
Calhoun	11.0	.75	43.30
Carroll	10.1	.55	42.20
Chickasaw	11.4	.64	41.00
Choctaw	10.8	.72	41.80
Claiborne	11.8	.25	36.20
Clarke	11.2	.65	42.20
Clay	12.0	.50	39.20
Coahoma	10.7	.36	37.80
Copiah	11.3	.51	40.10
Covington	10.8	.65	41.20
De Soto	12.2	.82	39.60
Forrest	12.4	.72	39.00
Franklin	11.6	.63	43.10

COUNTY	MEDIAN YEARS OF EDUCATION	PROPORTIONATE NON-BLACK	ADJUSTED* MEDIAN AGE (ADULT)
George	12.1	.90	39.90
Greene	12.0	.80	40.10
Grenada	11.8	.58	41.10
Hancock	12.2	.89	42.40
Harrison	12.5	.79	39.10
Hinds	12.7	.54	39.60
Holmes	9.9	.29	37.50
Humphreys	9.8	.34	36.70
Issaquena	9.6	.44	36.90
Itawamba	9.9	.93	44.00
Jackson	12.4	.80	38.70
Jasper	12.0	.51	41.00
Jefferson	9.4	.18	37.60
Jefferson Davis	10.8	.46	40.00
Jones	12.2	.77	42.60
Kemper	11.0	.45	41.00
Lafayette	12.4	.73	37.80
Lamar	12.4	.88	39.40
Lauderdale	12.3	.68	41.40
Lawrence	11.8	.69	40.50
Leake	10.8	.61	43.50
Lee	12.3	.79	41.70

TABLE 3.3, continued

COUNTY	MEDIAN YEARS OF EDUCATION	PROPORTIONATE NON-BLACK	ADJUSTED* MEDIAN AGE (ADULT)
Leflore	10.8	.40	37.70
Lincoln	12.2	.70	41.70
Lowndes	12.3	.65	38.40
Madison	12.2	.44	38.30
Marion	11.8	.70	41.10
Marshall	10.6	.46	37.70
Monroe	11.2	.70	41.70
Montgomery	10.5	.59	44.40
Neshoba	11.5	.71	42.30
Newton	12.1	.70	44.20
Noxubee	9.9	.35	38.40
Oktibbeha	12.7	.65	35.30
Panola	10.2	.51	39.90
Pearl River	12.2	.85	40.90
Perry	12.1	.78	39.70
Pike	12.1	.56	41.30
Pontotoc	11.2	.84	43.40
Prentiss	10.7	.89	43.00
Quitman	9.4	.44	38.60
Rankin	12.4	.81	41.00
Scott	11.0	.65	41.00
Sharkey	10.4	.34	36.60

COUNTY	MEDIAN YEARS OF EDUCATION	PROPORTIONATE NON-BLACK	ADJUSTED* MEDIAN AGE (ADULT)
Simpson	12.0	.69	41.50
Smith	12.0	.79	42.40
Stone	12.3	.77	39.60
Sunflower	10.2	.38	37.70
Tallahatchie	9.5	.42	38.50
Tate	11.9	.61	38.60
Tippah	11.0	.84	43.20
Tishomingo	11.0	.96	44.90
Tunica	8.7	.27	35.70
Union	11.2	.86	44.20
Walthall	11.5	.59	41.00
Warren	12.3	.62	40.30
Washington	12.0	.44	38.10
Wayne	11.1	.66	39.10
Webster	11.7	.80	46.10
Wilkinson	10.7	.33	41.30
Winston	11.2	.60	42.60
Yalobusha	11.0	.62	43.20
Yazoo	11.2	.48	40.30

*Adjusted median age was derived by comparing the state median age with the Mississippi Literacy Assessment sample median age. This difference was then used to adjust upward each county median estimate to reflect an adult rather than total age population.

Source: Southern Growth Policies Board County Data File

TABLE 3.4

Projection Of Literacy Proficiency for Mississippi Counties[a]

COUNTY	POPULATION 1985	PROSE ESTIMATE	DOCUMENT ESTIMATE	QUANTITATIVE ESTIMATE
Adams	39546	258.33	252.58	264.90
Alcorn	33042	271.76	268.18	283.52
Amite	13431	247.64	241.58	255.70
Attala	19269	248.43	242.46	258.01
Benton	8627	244.50	239.14	254.67
Bolivar	45144	246.53	240.35	251.86
Calhoun	15468	257.72	252.98	268.39
Carroll	9538	241.98	235.87	251.17
Chickasaw	18109	257.80	252.78	266.68
Choctaw	9006	256.06	251.35	266.59
Claiborne	12188	246.39	239.47	249.58
Clarke	16992	255.79	250.62	265.17
Clay	21939	257.44	251.84	263.79
Coahoma	35740	241.32	234.70	247.05
Copiah	26520	251.86	246.10	259.22
Covington	26598	253.54	248.48	263.21
De Soto	59790	273.89	270.50	283.98
Forrest	68225	271.54	267.63	280.22
Franklin	8725	257.18	251.77	266.01
George	16154	276.85	273.98	288.09

COUNTY	POPULATION 1985	PROSE ESTIMATE	DOCUMENT ESTIMATE	QUANTITATIVE ESTIMATE
Greene	9557	270.92	267.27	281.02
Grenada	21933	258.27	252.91	266.08
Hancock	30083	275.07	271.73	286.42
Harrison	168858	275.25	271.78	284.60
Hinds	258267	264.99	259.78	271.28
Holmes	23610	231.85	224.65	237.50
Humphreys	14155	234.25	227.52	240.56
Issaquena	2312	237.18	231.08	244.92
Itawamba	20494	256.85	253.06	271.10
Jackson	125654	275.45	272.12	285.03
Jasper	17549	256.50	250.68	263.21
Jefferson	9057	222.71	214.66	227.58
Jefferson Davis	14539	245.47	239.27	252.68
Jones	63669	268.98	264.73	278.83
Kemper	10270	245.81	239.42	252.83
Lafayette	31377	272.54	268.82	281.10
Lamar	26493	278.79	275.93	289.46
Lauderdale	78666	266.60	261.95	275.12
Lawrence	13094	263.93	259.44	272.99
Leake	19246	249.75	244.02	259.26
Lee	60751	271.78	267.88	281.73
Leflore	42501	244.41	238.15	250.60
Lincoln	31018	266.48	261.90	275.38

COUNTY	POPULATION 1985	PROSE ESTIMATE	DOCUMENT ESTIMATE	QUANTITATIVE ESTIMATE
Lowndes	59161	267.67	263.31	275.48
Madison	47778	256.94	251.10	262.26
Marion	26948	263.79	259.24	273.01
Marshall	32211	245.73	239.86	252.87
Monroe	36894	258.63	253.90	268.56
Montgomery	12971	245.37	239.26	255.01
Neshoba	24533	260.83	256.10	270.65
Newton	20158	263.76	258.77	273.16
Noxubee	12981	234.18	227.28	240.71
Oktibbeha	36854	273.07	269.22	280.08
Panola	29392	242.89	236.91	251.22
Pearl River	38539	274.25	270.85	284.86
Perry	10404	271.21	267.52	280.95
Pike	37305	259.64	254.18	266.96
Pontotoc	21997	263.75	259.70	275.60
Prentiss	24783	262.35	258.61	275.21
Quitman	11192	234.09	227.67	242.18
Rankin	78676	273.99	270.35	283.96
Scott	25417	255.03	249.99	264.40
Sharkey	7951	239.21	232.62	244.94
Simpson	24274	264.78	260.17	273.79
Smith	15056	268.46	264.35	278.72
Stone	9951	272.24	268.50	281.60

COUNTY	POPULATION 1985	PROSE ESTIMATE	DOCUMENT ESTIMATE	QUANTITATIVE ESTIMATE
Sunflower	36608	238.33	231.77	244.78
Tallahatchie	16435	234.31	227.82	242.12
Tate	21113	262.45	257.71	270.19
Tippah	18923	262.25	258.19	274.25
Tishomingo	18049	266.29	262.75	279.95
Tunica	9465	222.64	215.35	229.03
Union	21987	263.91	259.85	276.09
Walthall	13754	256.18	250.82	264.34
Warren	51863	264.63	259.74	272.28
Washington	71309	255.38	249.52	260.85
Wayne	20205	258.16	253.56	267.40
Webster	10420	263.54	258.83	274.82
Wilkinson	10389	237.37	230.02	243.24
Winston	19176	253.14	247.56	261.98
Yalobusha	13261	251.70	246.08	261.00
Yazoo	27307	249.48	243.46	256.59

*Projections are not based on direct measurement but rather are produced by modeling.

Section 4. Group Differences in Literacy Proficiency

The Mississippi Literacy Assessment data can be used to contrast the literacy differences among the major demographic and social subgroups of the Mississippi population. An understanding of these subgroup differences is important in defining and describing the magnitude of literacy problems in the state. Policy debate can benefit from knowledge of subgroup variations since this information can be of great value in selecting programmatic approaches, identifying population needs, and targeting interventions. Our analysis of subgroup differences generally follows the format of *The Subtle Danger: Reflections on the Literacy Abilities of America's Young Adults.*[1] A parallel reading of this section with *The Subtle Danger* will allow the reader to compare patterns found in the Mississippi data with those found in the National Young Adult Study.

TABLE 4.1

Mean Literacy Scores for
Mississippi Adults by Sex[a]

Scale	Total (N=1791)	Female (N=939)	Male (N=851)
Prose	258(2.2)	261(2.5)	255(3.0)
Document	253(2.8)	249(3.0)	257(3.3)
Quantitative	268(2.4)	264(2.3)	272(3.1)

[a]Number in parentheses is standard error estimate

In Table 4.1, mean scores for prose, document, and quantitative scales are presented for the Mississippi adult population divided by sex. The implication of these data is that male and female Mississippians vary little in their literacy skills. Our assessment using these four indicators of literacy resulted in no differences larger than seven points. (This finding of similar literacy skills for men and women also was observed in the NAEP literacy assessment.) The implication is that Mississippi men and women are equally prepared (or equally unprepared) in their general literacy abilities.

Differences by age were also examined. These age-linked literacy data are very interesting since there are few cross sectional data that directly link measurements of literacy to a broad spectrum of adult-aged groupings. To our knowledge, the Mississippi Literacy Assessment and the parallel study conducted in Oregon are the only ones that have data available using direct measurement of the type developed by ETS. The Mississippi sample was divided into six age groupings of ten-year intervals. Substantial differences were observed among these age groups as indicated by the difference in mean literacy scores (Table 4.2). In general terms, young adults (15-24 years) had literacy scores somewhat above the state average; the scores increased for the 25-34 age group and peaked for the 35-44 age group; and from that point on, literacy scores dropped off markedly. The 65 and over group had mean scores that were substantially less than the peak group. For example, mean prose

scores for the 65 and over group were 79 points lower than for the 35-44 age group. Similar differences of 83 points for document skills and 67 points for quantitative skills also were obtained. Such differences are substantial, and the magnitude of the difference indicates important age-linked skill level differences. If we use the population mean as a reference point, it is clear that Mississippi adults younger than 45 scored above the state average in all scales. On the other hand, those older than 45 are more likely to score below the state average. The elderly were most likely to score substantially below that figure.

The reason for this age-linked pattern is not easily determined. At least two types of explanations can be set forth. First, we know that literacy ability is strongly related to education. It is possible that the patterns observed are the result of cohort effects where the quality and extent of education differed substantially for different age cohorts. Such an argument would imply that middle-aged Mississippians had received better education (in terms of literacy training) than either younger age groups or older age groups. If such a cohort influence does exist, it might best be referred to as a "baby boom" effect, since the peak scores are for adults in that age category. The argument would be that baby boomers received better literacy education.

TABLE 4.2

Mean Literacy Scores of
Mississippi Adults by Age*

Scale	15-24 (N=294)	25-34 (N=375)	35-44 (N=358)	45-54 (N=250)	55-64 (N=197)	65+ (N=316)
Prose	264(3.8)	274(3.9)	289(3.9)	261(4.1)	236(7.9)	211(3.6)
Document	264(5.0)	273(3.8)	281(4.0)	252(4.0)	236(5.6)	198(4.4)
Quantitative	272(4.5)	281(4.1)	297(3.7)	267(3.6)	250(6.1)	229(4.0)

*Number in parentheses is standard error estimate

TABLE 4.3

Mean Literacy Scores for
Mississippi Adults by Race*

Scale	Total (N=1791)	White (N=1197)	Black (N=576)
Prose	258(2.2)	278(1.6)	219(3.7)
Document	253(2.8)	274(2.4)	208(3.4)
Quantitative	268(2.4)	290(2.2)	221(3.0)

*Number in parentheses is standard error estimate

A second interpretation is that these results are a consequence of a maturation process. According to the developmental thesis, individuals acquire and add to their literacy skills to a point in early middle age. After that period the detrimental effects of aging come into play leading to a gradual decrease in literacy ability. After about age 65, this pattern continues, but the rate of literacy loss increases with marked diminishment of literacy ability.

Differences by race found in the Mississippi Assessment data are presented in Table 4.3. Data are presented only for white and black subgroups because the numbers of Hispanics, Native Americans, and Asian Americans are so small in the Mississippi population that the sample did not include enough of these groups to provide accurate estimates. There is a clear pattern in the data. Black Mississippians score considerably lower on all measures of literacy. The magnitude of the race difference is substantial with black Mississippi adults scoring approximately 50 to 60 points lower than whites. A similar pattern for national data was found in the NAEP young adult survey.

In assessing the sharp racial differences in literacy performance, it is important to remember that Mississippi has the largest percentage black population in the nation. Estimates indicate that the 1990 black population is approximately 36-37 percent of the state population. To the policymaker and the program provider, the sharp racial differences are significant. A major

segment of the state's population has severe adult literacy problems which are in some fashion associated with race.

Table 4.4 depicts the Mississippi Literacy Assessment data in terms of mean literacy scores for Mississippi adults for each level of educational attainment. The scores here are very telling. Adults with 8 or fewer years of schooling scored considerably lower than those with more schooling. For example, individuals with 0-8 years of education scored an average of 81 points less on all three scales than high school graduates. Those who had some high school education also scored an average of 36 points lower than high school graduates. On the upper end of the educational spectrum, the mean literacy scores for college graduates are an average of 51 points higher than those of high school graduates. The most profound differences were found in the literacy scores of college graduates and individuals with 0-8 years of education. Those with college degrees scored an average of 132 points higher over the three scales than those with only grade school levels of education. Prose scores were 134 points higher, document scores were 141 points higher, and quantitative scores were 121 points higher.

TABLE 4.4

Mean Literacy Scores for Mississippi
Adults by Years of Education*

Scale	0-8 Education	9-12 Education	HS Education	> HS Education	College Graduate
Prose	179(4.3)	229(3.4)	262(2.6)	287(2.7)	313(2.6)
Document	170(4.7)	220(3.6)	258(2.7)	284(3.3)	311(3.2)
Quantitative	200(5.1)	234(3.8)	272(2.4)	297(2.7)	321(3.5)

*Number in parentheses is standard error estimate

Table 4.5 presents the mean prose scores of Mississippi adults by race and years of education. These scores indicate that there is a significant variation between the white and black population in Mississippi, even when their educational attainment levels are similar. The white population scored consistently higher than the black population. White adults with eight or fewer years of schooling scored 54 points higher than blacks with the same educational level. The pattern continues at the other educational levels. In the categories of those with some high school, those with high school diplomas and those with some college, whites scored from 32 to 39 points higher than blacks. Astonishingly enough, there was an even greater difference among the white and black population of individuals with college degrees. White college graduates scored 51 points higher than black adults with the same status. Within the realm of this study, the reasons for these substantial differences can only be speculated. While the mean prose scores of blacks did increase with years of schooling, they did not rise as significantly as the scores of whites (with the exception of blacks with 0-8 years of schooling as compared to those with some high school). Thus, the positive effect of educational levels upon literacy levels is not as strong among the black population. Other factors are at work in the dynamics of literacy among Mississippi adults.

TABLE 4.5

Mean Prose Scores of Mississippi
Adults by Race and Years of School*

Years of School Completed	Total (N=1788)	White (N=1197)	Black (N=573)
0-8 Education	179(4.3)	207(4.8)	153(5.2)
9-12 Education	229(3.4)	243(4.1)	211(6.2)
HS Education	262(2.6)	274(2.2)	236(4.9)
> HS Education	287(2.7)	296(2.6)	257(6.1)
College Graduate	313(2.6)	323(2.9)	272(6.9)

*Number in parentheses is standard error estimate

The sharp differences in literacy ability among black and white adult Mississippians most likely results from a number of important social and economic factors. Educational attainment, segregated schools, parental social class, and discrimination in the workplace are examples of factors that could partially explain such differences. While it is beyond the scope of this report to attempt a detailed study of the racial differences, a limited analysis was conducted to investigate the importance of educational level on literacy performance. It can be demonstrated that the level of educational attainment (usually measured in years of school completed) has a strong positive effect upon literacy level. It also is known that there are large racial differences in the level of educational attainment. On average, white adults have completed more years of formal education than have black adults. This pattern is true both for the national and Mississippi populations. This analysis, however, does not determine to what extent the differences in educational attainment account for the differences in black/white levels of literacy.

In recent years, there has been a growing body of research on the process through which families pass on social, economic, educational, and other status variables to their children. Research on the intergenerational transfer of status has identified such factors as mental ability, significant other influences, academic performance, and early educational attainment as key

intervening influences in the transfer of status from one generation to the next. Kirsch and Jungeblut[2] report that the scores of young adults on each of the literacy scales were associated with the level of educational attainment of parents.

A similar pattern occurred in the Mississippi Literacy Assessment Project. In Table 4.6, mean scores are tabulated by mother's educational level. Generally mean scores increased with increased level of mother's education. Individuals whose parents' educational level was eight years or less had greatly reduced literacy scores. Respondents whose mothers were high school graduates scored substantially higher than those whose mothers had 0-8 years of schooling. Over the three scales of prose, document, and quantitative skills, respondents scored an average of 54 points higher if their mothers had completed high school. There also was a noticeable difference between the scores of those individuals whose mothers had graduated from college and those whose mothers were high school graduates. Children whose mothers received college degrees averaged eleven points higher on all three scales. The most apparent discrepancy in scores is found when comparing respondents

TABLE 4.6

Mean Literacy Scores and the
Level of Mother's Education*

Scale	0-8 Education	9-12 Education	HS Education	> HS Education	College Graduate
Prose	236(3.8)	260(2.9)	287(3.1)	304(5.6)	297(6.1)
Document	227(3.4)	254(3.3)	286(3.1)	299(5.4)	297(5.9)
Quantitative	245(3.9)	269(3.5)	297(2.8)	305(4.8)	310(5.7)

*Number in parentheses is standard error estimate

whose mothers had eight or fewer years of schooling with those whose mothers were college graduates. Individuals whose mothers were college graduates scored an average of 65 points higher than those whose mothers had only grade school levels of education. The differences in prose, document, and quantitative scores were 61 points, 70 points, and 65 points, respectively.

It is probable that the influence of parental status on subsequent literacy levels of their children when they become adults can be associated with the number of intervening influences. Parents with higher levels of education are more apt to have reading materials present in the home (Kirsch and Jungeblut, 1986), are more apt to provide parental encouragement for higher levels of educational achievement, are more likely to engender in their children both higher aspirations and expectations for educational and occupational attainment, and are more likely to provide financial resources for continued educational attainment.

It seems reasonable that literacy skills could also be included in this intergenerational process as both a mediating and outcome variable. Venezky et al, (1987) refer to the complexity of the relationship between the literacy and educational attainment as not being simply unidirectional but instead mutually reinforcing. Their argument is simply that in one respect individuals who exert more effort and spend more time in schooling activities will develop

higher level literacy skills. On the other hand, individuals with higher level literacy skills will have greater success in schooling activities and thus will be more inclined to seek higher levels of educational attainment. This strong relationship between literacy skills and educational attainment has already been observed in the Mississippi Literacy Assessment data.

The foregoing analysis of social status implies that lower literacy scores are associated with lower levels of educational attainment which also suggests a linkage with poverty. Table 4.7 depicts the impacts of more direct measures of poverty. In this table, mean scores are provided for Mississippi adults who reported receiving no government assistance and those who reported receiving any government assistance. Approximately one-third of the sample said that they received government assistance. The group who did receive government assistance had mean scores approximately thirty to forty points lower than the no-government-assistance group. The government assistance group was further divided by those who received food stamps; Women, Infant, Children (WIC) payments; and Aid for Families with Dependent Children (AFDC). Rates for the food stamp group were even more divergent from those not receiving government assistance with literacy scores generally about 60 points lower. These data closely link poverty and lower levels of literacy skills.

TABLE 4.7

Literacy Scores as Related to Government Assistance*

Scale	No Assistance	Any Assistance	Food Stamps	WIC	AFDC
Prose	270(2.4)	234(3.7)	219(5.7)	236(4.9)	227(6.5)
Document	267(2.8)	225(3.8)	208(5.2)	239(4.1)	218(5.7)
Quantitative	281(2.7)	242(3.8)	224(5.4)	243(4.7)	225(6.1)

*Number in parentheses is standard error estimate

When this finding is taken into account in concert with the previous set of findings on intergenerational mobility, there is good reason to be concerned about the future of the Mississippi population. The Mississippi Literacy Assessment indicates that Mississippians with lower levels of educational attainment will be more apt to transmit low educational attainment to their children. Furthermore, there is good reason to believe that these lower levels of attainment will result in both lower literacy skills and a higher dependency on government assistance. At this point, the data give great insight into the processes that create and transmit poverty. These forces are now operating and most likely will shape significantly the future adult population of Mississippi unless there are significant and far reaching interventions. At this point in the analysis of literacy differences among subgroups in the Mississippi population, we identified several strong relationships. Three of these are of special interest for the present analysis. First, we have observed an association between race and literacy levels in which white adult scores were substantially higher than black adult scores. Second, parental education was also found to be associated with differences in literacy scores where those respondents whose parents had higher levels of education tended to have high literacy scores. Third, there was also a strong relationship with respondents' level of education and the level of their literacy scores. An interesting question can be posed concerning how these variables relate among themselves within the context of an intergenerational process.

In Figure 4.8, we have presented a particular analytic model that structures these influences in a causal sequence consistent with an intergenerational transfer of status. The particular model hypothesizes a series of interesting research questions. First, it hypothesizes that the effects of parental education on adult literacy can be explained in terms of two primary influences. These are direct influences between parental education and literacy and an indirect influence through subject's education where subject's education is seen as an intervening or mediating variable. The particular model is also structured to analyze the effects of race on literacy proficiency in terms of both direct and indirect influences. Three path models were developed that alternately assess the impact of these influences on prose, document, and quantitative literacy.

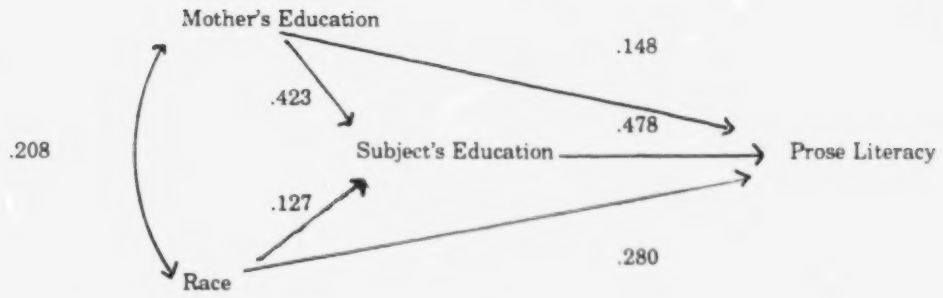
The overall results of the three models follow a similar pattern. First, the total association of parental education upon respondent's literacy levels tended to fall in the range of .40-.50 levels of correlation. When the correlations are decomposed in the path analysis, approximately one-half of the effect was indirect through subject's education. In substantive terms, this finding is consistent with a causal sequence in which parents with higher levels of education encourage and facilitate their children's efforts to achieve higher levels of education, which in turn is translated into higher levels of

literacy proficiency. We were able to detect an ordered intergenerational sequence for these variables.

The path model was less successful in explaining the effects of race upon literacy scores. The degree of association between race and literacy was of about the same magnitude as that for parental education (.40-.50 range). However, within the structure of the path model, the majority of the effects remain direct. The lack of a mediating effect of respondent's education needs to be addressed. There are a number of possibilities that can explain this outcome. It is possible that level of education between blacks and whites may not measure equal educational experiences between black and white adults in Mississippi. We may be comparing among older Mississippians the consequences of a segregated educational system. It is also possible that white families are better able to transmit status advantages to their children than can black families. In other words, if a society discriminates on the basis of race, the impact of that discrimination may take precedence over social class differences in the intergenerational transfer of social currency.

TABLE 4.8

Path Model for Prose Literacy



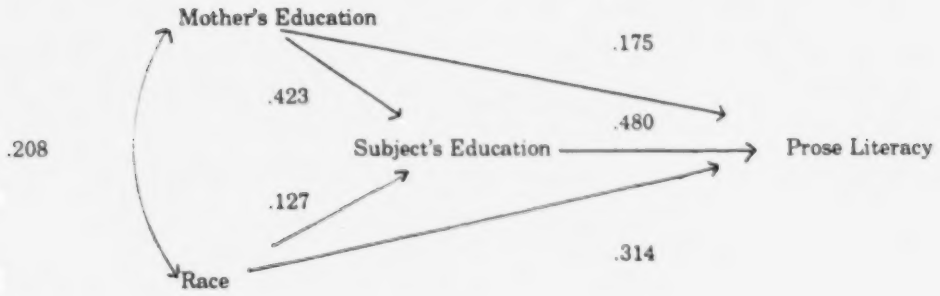
R=.684*
R^2=.467

Decomposition of Effects				
Variable	Total Association of Prose Literacy	Direct	Indirect	Spurious
Mother's Education	.421 (100%)	.148 (35%)	.202 (48%)	.071 (17%)
Race	.414 (100%)	.280 (68%)	.061 (15%)	.073 (18%)

*For Prose Literacy

TABLE 4.9

Path Model for Document Literacy



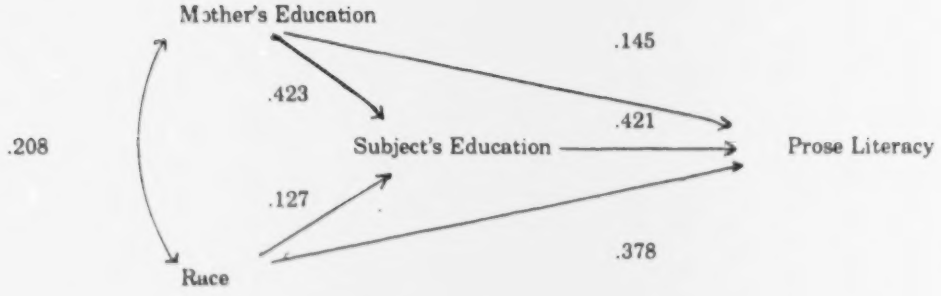
R=.723*
R^2=.572

Decomposition of Effects				
Variable	Total Association of Document Literacy	Direct	Indirect	Spurious
Mother's Education	.456 (100%)	.175 (38%)	.203 (45%)	.078 (17%)
Race	.454 (100%)	.314 (69%)	.061 (13%)	.078 (17%)

*For Document Literacy

TABLE 4.10

Path Model for Quantitative Literacy



R=.686*
R^2=.471

Decomposition of Effects				
Variable	Total Association of Quantitative Literacy	Direct	Indirect	Spurious
Mother's Education	.413 (100%)	.145 (35%)	.178 (43%)	.090 (22%)
Race	.499 (100%)	.378 (76%)	.053 (11%)	.067 (13%)

*For Quantitative Literacy

ENDNOTES TO SECTION 4

[1]Vanezky, Richard L., Carl F. Kaestle, and Andrew M. Sum, *The Subtle Danger: Reflections on the Literacy Abilities of America's Young Adults*, (Princeton, NJ: Educational Testing Service, 1987).

[2]Irwin S. Kirsch and Ann Jungeblut, *Literacy: Profiles of America's Young Adults*, Report Number 16-PL-02.. (Princeton: Educational Testing Service, 1986).

Section 5. Literacy and the Workplace

One of the most profound changes in the American workplace is the increasing information requirements predicated by the infusion of high technology into everyday use. Microprocessor technology, for instance, can be found everywhere from the grocery checkout stand to robotics in the factory. Other technologies also are finding their way into virtually every niche of the labor force. This transition is no less true in Mississippi today and will increasingly be so in the foreseeable future.

The net impact of these subtle yet profound shifts in the contemporary world is what Alvin Toffler[1] calls the "powershift." He is referring to the new workplace in which information is the cornerstone of competitive economic activity. In Toffler's future, literacy levels in the workplace will become the prime factor for a state like Mississippi to successfully participate in the changing rules of this new economic game.

How does the Mississippi work force fare in its ability to process information in terms of documents, writing, and quantitative manipulations? This section examines the patterns of literacy performance in the Mississippi workplace in several steps. First, a demographic profile of adults active in the state's labor force is presented. Second, literacy proficiency for those active in the labor force is compared to those not active in employment. These literacy scores also are compared across major occupational groups in the state. Third, the specific literacy skills that Mississippi Literacy Assessment respondents who are active in the labor force perceive to be of importance in their jobs are described. Finally, the specific information-processing activities that are used in the Mississippi labor force by Mississippi Literacy Assessment respondents are presented. These skills are delineated by major occupational groups so that the variety of information-handling patterns existing in the workplace can be readily ascertained.

In Table 5.1, a demographic profile of those active in the Mississippi labor force shows a pattern that is very consistent with other studies of such participation. More men than women are active in paid employment. Working patterns by age represent the well-known employment rate curve--participation

TABLE 5.1

Demographic Profile of Active Mississippi Labor Force

	Labor Force Active N=(1126) (Percent)	Other N=(665) (Percent)	Total N=(1791) (Percent)
Sex			
Males	73.1	26.9	47.5
Females	53.6	46.4	52.5
Age			
15-24	63.3	36.7	16.4
25-34	81.0	19.0	20.9
35-44	79.1	20.9	20.0
45-54	75.0	25.0	13.9
55-64	53.7	46.3	11.0
65-75	18.8	81.2	17.7
Race			
White	64.0	36.0	66.9
Black	60.5	39.5	32.2
Education			
0-8 years	32.3	67.7	13.4
9-12 years	49.9	50.1	19.5
HS Grad.	66.4	33.6	29.0
Some College/Jr. College	75.9	24.1	21.7
College Graduate	80.4	19.6	16.4
Marital Status			
Single	65.6	34.4	19.2
Married	67.4	32.6	60.2
Separated	63.2	36.8	11.7
Widowed	20.5	79.5	7.8

Source: Mississippi Adult Literacy Survey

is highest in the 25-to-54 age range and lower among other age groups, especially after age 65. Whites are slightly more likely than blacks to be active participants in the labor force, by about 3.5 percent on the average.

The linkage of the lack of a high school diploma with lower labor force participation rates is very evident in Table 5.1. Only one-third of those with less than 8 years of schooling are active, and this amount increases to about one-half for those with some high school completed. However, fully two-thirds of the high school graduates and three-fourths of those with some college experience are actively employed in the labor force. This percentage increases to 80 percent among the college graduates.

With the shifting patterns of household living arrangements in the U.S. being an important social change during the decade of the 1980s, it is surprising to find that marital status is only slightly related to labor force participation. There is virtually no difference among those who are single, married, or separated in their participation rates as about two-thirds of each respective group are active employees. Only those who are widowed report lower employment rates, a situation that seems clearly a function of age.

From this demographic profile, it is clear that education is the most powerful factor among those variables contained in Table 5.1 in differentiating labor force participation status. It is followed by gender and age.

How do those Mississippi adults who are active in the labor force compare with those who are not active in terms of their literacy proficiency? In Table 5.2, the average literacy scores for prose, documents, and quantitative skills are shown by employment status. In each case, literacy proficiency is positively related to being in the labor force. Those who are active in the labor force score about 40 points higher in prose literacy, 50 points higher in handling documents, and about 40 points on the average in mathematical manipulation skills.

A similar question is explored in Table 5.3 which profiles average literacy proficiency scores by major occupational groups: professional-technical and managerial, clerical and sales, foreman-skilled, unskilled, and other workers. The clearest pattern in this table is the near-perfect ordering of the average literacy scores across these major occupational groups. Those in the professional-technical-managerial group score the highest, followed by clerical-sales, skilled, and unskilled workers. The "other" category, being a residual group, tends to score closest to the clerical-sales occupational group. It is not

TABLE 5.2

Mean Literacy Proficiency Score for Active Labor Force and Other Mississippians

Scale	Active Labor Force N=(1126)	Not active N=(665)
Prose Score	272	234
Document Score	270	224
Quantitative Score	282	244

TABLE 5.3

Mean Literacy Proficiency for Major Occupational Categories*

Scale	Prof/Tech Managerial N=(328)	Clerical Sales (N=193)	Foreman Skilled N=(290)	Unskilled N=(232)	Other N=(44)
Prose Scale	304	285	257	235	281
Document Scale	299	283	254	231	288
Quantitative Scale	311	292	269	244	302

*There were 1126 participants classified as labor force active. Of these, there were 39 cases of missing occupational information.

entirely surprising that those workers who are in professional, technical, or managerial occupations show much higher literacy proficiency than the "blue-collar" occupations. This is the same pattern that clerical-sales workers exhibit but on a smaller scale. The distinction between the skilled and unskilled occupations is also sharp. The capacity to handle writing tasks, process information found in standard document form, and use mathematical procedures to handle quantitative information is found in greater degrees among skilled rather than unskilled employees in Mississippi's work force.

While these patterns of literacy proficiency scores are telling features of the linkage of adult literacy to the workplace, what specific skills are most important to these major occupational groups in Mississippi? Table 5.4 shows a breakdown of eleven specific information-processing activities by occupational group. The figure displayed in this table is the percentage of respondents rating each activity as "important," "pretty important," or "very important" to their jobs.

What is striking about these figures is how varied the importance of these tasks is across occupational categories. The professional-technical-managerial group considers *all* of these activities as important to their job requirements. Clerical-sales workers view *most* of them as important, while the skilled workers indicate that *many* are important. The unskilled workers

TABLE 5.4

Importance of Specific Literacy Skills to Job Performance*

	Prof/Tech Managerial	Clerical Sales	Foreman Skilled	Unskilled
Reading	98.5%	94.9%	85.8%	67.9%
Writing	97.6%	92.0%	79.1%	65.2%
Math	94.9%	91.7%	82.5%	61.4%
Talking	98.9%	97.8%	95.3%	85.7%
Listening	99.1%	98.4%	97.6%	92.6%
Solve Problems	99.0%	96.0%	93.1%	81.1%
New Ideas	95.2%	85.8%	78.6%	63.8%
Work with others	98.8%	98.3%	95.9%	90.7%
Planning	92.8%	83.7%	85.4%	70.5%
Organizing	99.2%	94.1%	86.7%	74.8%
Leading	92.6%	76.2%	74.7%	79.5%

*Percentage reflects respondents who indicated that the skill was important, pretty important or very important to their job performance.

report that *some* of these activities are important to their job requirements. On the one hand, there is a sharp contrast between professional-caliber workers, who must process information in a wide variety of ways, and unskilled employees, who indicate that it is largely through interacting with others that is important to their work life. One area in which this is evident is in the three traditional basic skills of reading, writing, and math. Over 90 percent of those in either the professional or clerical-sales groups rate these traditional literacy areas as important to their job activities. By contrast, two-thirds or fewer of the unskilled workers in Mississippi say that they are important to their employment situation.

In essence, the data in this table suggest that these communication activities--talking, listening, working with others--may comprise a "core" set of literacy skills that cut across major occupational lines while other activities involving creativity (new ideas, solving problems) or initiative (planning, organizing, leading) are of a priority only among those of the highest status positions in the paid labor force. Regarding the shifting nature of literacy requirements created by high technology in blue-collar work-settings, this pattern of results suggests that unskilled, and to some degree skilled, workers will likely face a stark change in the requirements of employment in the future.

The Mississippi Literacy Assessment Survey also collected information about the frequency of using specific literacy skills in the workplace. These skills are organized around the three literacy domains of the ETS measurement approach: prose, documents, and mathematics. For each activity, the frequency of using a specific skill at work is compared across these four major occupational groups. For prose skills, Tables 5.5 to 5.8 contain the results for the activities of using (reading) a report or journal article, forms, letters, or diagrams. For document skills, Tables 5.9 to 5.12 contain the results for the activities of using memoranda, reports, forms, or bills. For math activity, Table 5.12 contains the results of a single direct question concerning the use of mathematics on the job.

The results for prose literacy skills echo the overall results for the importance placed upon those skills by occupational groups. Table 5.5 through 5.8 demonstrate the ordering of frequency of use of specific prose-related activities by occupational group. Professionals make substantially greater use of prose activities than do the other occupational groups. The magnitude of these differences is about three-to-one in that about 75 percent of the professionals report using each skill at least once a week in comparison to only around 25 percent of the unskilled workers doing so. The other two occupational groups fall in between these two extreme groups.

The pattern of results for using documents is similar with two important exceptions. Clerical and sales workers make use of forms almost as much as do professional-technical-managerial employees (78 versus 74 percent). However, clerical and sales employees report using bills slightly more than do respondents in the professional group (44.5 versus 43.2 percent).

In the use of mathematics at work, Table 5.13 shows that while this same general pattern holds in this domain of literacy skills, the professional and clerical-sales groups report rather similar frequencies of using math at least once a week in job activities (93 versus 90 percent). Only one-half of the unskilled workers, by comparison, report that they use math skills at work on a weekly basis.

The Mississippi Literacy Assessment data have provided a number of important insights into both the literacy skills of the labor force and the literacy demands of the workplace. The active members of the Mississippi labor force were more likely to have better "functional literacy" skills than those who were not employed. This pattern was observed for prose scores, document scores, and quantitative scores. An important question is whether low literacy scores of the unemployed limit their access to jobs. Within those adults who were actively participating in the force, there was a strong and

TABLE 5.5

Frequency of Prose Skill: Reading Reports or Journal Articles by Occupational Group

	At least once a week	Less than once a week*	N
Prof/Tech. and Managerial	78.1%	22.0%	325
Clerical and Sales	58.2%	41.9%	191
Skilled and Foreman	40.3%	59.7%	287
Unskilled	24.5%	75.4%	226

*Less than once a week includes jobs where this is not applicable.

TABLE 5.6

Frequency of Prose Skill: Reading Forms by Occupational Group

	At least once a week	Less than once a week*	N
Prof/Tech. and Managerial	84.8%	15.3%	325
Clerical and Sales	72.5%	27.6%	192
Skilled and Foreman	57.5%	42.4%	287
Unskilled	38.8%	61.3%	226

*Less than once a week includes jobs where this is not applicable.

TABLE 5.7

Frequency of Prose Reading Skill: Reading Letters by Occupational Group

	At least once a week	Less than once a week*	N
Prof/Tech. and Managerial	72.8%	27.2%	325
Clerical and Sales	60.2%	39.8%	192
Skilled/Foreman	30.8%	69.2%	287
Unskilled	20.1%	79.9%	206

*Less than once a week includes jobs where this is not applicable.

TABLE 5.8

Frequency of Prose Skill: Reading Diagrams by Occupational Group

	At least once a week	Less than once a week*	N
Prof/Tech. and Managerial	53.8%	46.2%	326
Clerical and Sales	24.3%	75.7%	191
Skilled/Foreman	45.2%	54.8%	287
Unskilled	18.5%	81.5%	228

*Less than once a week includes jobs where this is not applicable

TABLE 5.9

Frequency Of Document Skills: Writing Memoranda by Occupational Group

	At least once a week	Less than once a week*	N
Prof/Tech. and Managerial	68.8%	31.2%	324
Clerical and Sales	51.3%	48.7%	193
Skilled/Foreman	19.5%	81.5%	286
Unskilled	13.8%	76.2%	224

*Less than once a week includes jobs where this is not applicable.

TABLE 5.10

Frequency of Document Skills: Writing Reports by Occupational Group

	At least once a week	Less than once a week*	N
Prof.Tech. and Managerial	72.6%	27.4%	325
Clerical and Sales	58.6%	41.4%	191
Skilled/Foreman	43.4%	56.6%	286
Unskilled	26.7%	73.3%	224

*Less than once a week includes jobs whree this is not applicable.

TABLE 5.11

Frequency of Document Skills: Filling Out Forms by Occupational Group

	At least once a week	Less than once a week*	N
Prof/Tech. and Managerial	77.8%	22.2%	325
Clerical and Sales	74.4%	25.6%	192
Skilled/Foreman	54.3%	45.7%	285
Unskilled	35.6%	64.4%	227

*Less than once a week includes jobs where this is not applicable.

TABLE 5.12

Frequency of Document Skills: Filling Out Invoices by Occupational Group

	At least once a week	Less than once a week*	N
Prof/Tech. and Managerial	43.2%	56.8%	324
Clerical and Sales	44.5%	55.5%	191
Skilled/Foreman	22.1%	77.9%	285
Unskilled	16.8%	73.2%	225

*Less than once a week includes jobs where this is not applicable.

TABLE 5.13

Frequency of Use of Mathematics Skills by Occupational Group

	At least once a week	Less than once a week*	N
Prof/Tech. and Managerial	92.9%	7.1%	327
Clerical and Sales	89.6%	10.4%	193
Skilled/Foreman	77.0%	23.0%	287
Unskilled	52.1%	47.9%	228

*Less than once a week includes jobs where this is not applicable.

consistent pattern for the literacy skills to vary by the type of work or occupation. Professional, managerial, and technical occupations are thought to demand the highest level of literacy skills. This pattern was found in that the professional, managerial, and technical workers had substantially higher levels of literacy proficiency than did other occupational groups. As would be expected, the unskilled workers were found to have the most problems with literacy skills.

Interestingly, most Mississippi workers reported that there was a fairly high demand for literacy skills in their work. The majority reported weekly requirements for the use of prose, document, and quantitative skills. Also, most Mississippi workers reported that a wide range of literacy and communication skills were important to their job performance. Unfortunately, we do not have comparable data on the Mississippi labor force of 10 or 20 years ago. Therefore, it is impossible to measure the degree to which either the labor force skills are improving or the degree to which job-linked literacy requirements are increasing. This section of the report provides the baseline information from which such observations reliably can be made in the future.

ENDNOTES TO SECTION 5

[1]Alvin Toffler, *Powershift: Knowledge, Wealth, and Violence at the Edge of the 21st Century* (New York: Bantam, 1990).

Section 6. Conclusion

The Mississippi Literacy Assessment provides the first set of comprehensive literacy data on a representative cross-section of the state's adult population. The survey reveals that Mississippians' literacy skills range from the very fundamental to the very accomplished. The basic skills associated with simple "in school" reading were pervasive throughout the population as most Mississippians were able to read at a rudimentary or basic level. Mississippians were less successful in completing simulation tasks that reflect the type of literacy skills needed to function competently in everyday community, work, and family settings. These "functional literacy" simulations included a number of prose, document, and quantitative tasks that ranged from the very simple to the very complex. The Mississippi Assessment findings point to low levels of "functional literacy" as the core of the state's literacy problem.

Literacy skills also varied greatly among the major social, demographic, and geographic groupings of the population. Through a series of data analyses, we attempted to delineate the major literacy patterns by educational, occupational, racial, age, and sex categories. This effort was greatly enhanced by the use of a series of literacy scales designed to locate a group or subgroup on continua of literacy proficiencies. The availability of this information should place Mississippi at the forefront of literacy research and empower the state to address this problem in a more systematic fashion. These data should be of great value in improving our understanding of literacy in Mississippi and thereby assist policy makers in their attempt to improve literacy levels in the state.

The major findings of the Mississippi Literacy Assessment are:

- The majority of Mississippians were able to read relatively uncomplicated, printed materials. Practically all were able to read at the rudimentary or basic levels as judged by the NAEP (reading) scale.

- There was generally a lower level of "functional literacy" as judged by prose, document, and quantitative scores.

- Men and women were about equally skilled (or unskilled) in their prose, document, and quantitative literacy proficiency.

- Literacy scores for blacks were substantially lower than scores for whites. These large differences were observed at each educational level of the respondents.

- Level of respondent education was found to have a strong association with each measure of literacy proficiency.

- Intergenerational influences upon literacy levels were also observed. Parental education was found to influence the individual attainment of respondents and through that variable ultimately influence the level of literacy proficiency.

- Younger Mississippians (age 45 or less) had higher scores than the general population while older adults (65 and older) had substantially lower scores.

- Adults who were actively engaged in the labor force tended to have higher scores than those not currently working.

- Welfare Mississippians (WIC, food stamps, and AFDC recipients) had lower literacy skills than the general adult population.

- Professional, technical, and managerial occupational groups were found to rank highest in literacy skills. Unskilled workers had substantially lower levels of literacy proficiency.

- Most Mississippi workers reported that functional literacy skills were important in their job performance. Sharp distinctions were observed between professional, technical, managerial workers and unskilled workers in the frequency of skill utilization.

- The projection of literacy scores to Mississippi counties resulted in a concentration of counties with lower skill levels along the western border of the state. This concentration was strongest in the Delta region.

- Coastal communities, university communities, suburban communities, and industrially-active communities tended to have the highest projected literacy scores.

The policy implications of the Mississippi Literacy Assessment can be discussed in terms of a number of state goals. The assessment data can be seen as the baseline from which progress in improving literacy can be judged. We now know where Mississippians stood in 1990 in terms of literacy proficiency. We also know the major social, demographic, and geographic levels of literacy skills. This information can be used to set policy goals for the decade. For the year 2000, for example, we could establish levels of improvement as goals defined by percentages of adults who perform at given prose, document, and quantitative levels. Subsequent follow-up studies could be used to determine if the goals were met. The Mississippi Literacy Assessment gives Mississippi policy makers the ability to understand where the state now stands in terms of "functional literacy," a method of defining goals for the future, and a means of measuring the achievement of these goals.

Because there are rarely sufficient resources available to adequately attack a problem like low literacy levels, the targeting of programs is an important policy issue. If the policy goal is to direct the resources toward localities with the largest number of adults possessing the greatest need, county estimates of literacy become important.

The projection data in this report have definite policy implications. There should be a strong geographic dimension to any policy that seeks to

improve literacy levels among Mississippians. Many of the traditional agricultural areas of the state have populations with very low "functional literacy" skills. The projections provide an excellent guideline for establishing priorities among counties. It should be made explicit that the literacy scores and the size of the population taken together provide the best ranking of literacy training needs. The Mississippi Literacy Assessment provides a rational means of objectively deciding on target locations for literacy programs.

Program designs can be enhanced by information gleaned from the assessment. If we better understand the nature and extent of the deficiencies in Mississippi literacy skills, we should be able to design programs that more effectively address the need to improve literacy skills. Several programmatic implications which can be drawn from the assessment are discussed below. They can impact upon both the form and the content of literacy programs.

Projected county literacy data help us focus on problem areas and, when used in concert with other county data, help to define the local environment for program development purposes. If the counties with lower scores, and presumably greater need, are geographically similar, then these common features may be an important consideration in the design of programs. Should our programs be designed for sparse rural areas or populated urban areas?

Should we be sensitive to special needs of minority populations in a given area? The projections can lend insights in addressing such questions.

The assessment data also can be used to help understand the skill level of program participants. A careful reading of the section on "Measuring Literacy" will result in a better feel for the range and complexity of skills that Mississippians possess. Furthermore, an understanding of the conceptional distinction between prose, document, and quantitative literacy can have the unanticipated effect of encouraging a broad definition of literacy. Once literacy is understood in these terms, the likelihood of moving from a reading-oriented-program stance to a functional-literacy-oriented program is increased.

The study also lends insight into the content needs of literacy programs. If Mississippians have difficulties with such documents as checkbooks and bus schedules, then these documents should become part of the literacy training programs. A detailed analysis of the type of prose, document, and quantitative skills needed by Mississippians in literacy programs can be used to establish thresholds for training programs. The assessment also established skill hierarchies which can be used as general guides for increasing the level of skills training as participants become more proficient.

In closing this report on a literacy assessment of Mississippians, it is advisable that we consider again the meaning of literacy. We have conceptualized literacy as the capacity to effectively process information that is needed to function competently in the modern world. This conceptualization most often is used in reference to an individual's skills. That is, literacy is normally seen as an individual characteristic. The conceptualization can be extended, however, from the individual to the group or societal level. Just as individual competency is associated with the ability to process information, so can group competencies be judged by that same ability. The Mississippi Literacy Assessment is an information-processing activity at the state level. A state's competency to effectively deal with its literacy problems will be, in part, a function of its collective skills of collecting, organizing, managing, and processing information about literacy. In this sense, the Mississippi Literacy Assessment makes the state collectively more "functionally literate" and, consequently, should further increase its capability to deal with this important state priority.

Appendix. Survey Methodology*

The Mississippi Literacy Assessment had a target population of the state's noninstitutionalized adults between the ages of 16 and 75 years of age. Although telephone surveys using random-digit-dialing procedures are typically used to reach such adult populations in social survey designs, a low telephone saturation level in Mississippi households, estimated to be about 82 percent by the U.S. Bureau of the Census[1], precluded the use of this approach. An alternate household interview design was developed using a two-stage sampling procedure. The first stage was the selection of households meeting the population criteria while the second stage involved the choice of an adult respondent within the household.

**This Appendix was written by Frank M. Howell of Mississippi State University and Keith Rust of WESTAT, Inc. Dr. Howell and Dr. Rust collaborated on this appendix as independent consultants to the Mississippi Literacy Assessment, neither having a role in the design nor implementation of the study itself. Information from and discussions with Dr. Arthur G. Cosby and Dr. Maxie P. Kohler were used in part to construct this overview of the survey methodology.*

In order to select a sample of Mississippi households that does not suffer from the known bias of undercoverage from non-telephone households[2], a two-stage design was employed. Briefly, the procedure used to select a sample of 3,231 households was as follows. A simple random sample of 600 addresses was drawn from a list of Mississippi household addresses compiled by Survey Sampling, Inc. (SSI). The list is incomplete and of unknown coverage in Mississippi, being drawn from listed domestic telephone numbers and addresses for registered automobiles. The complete list is believed to cover 86 percent of households in the U.S. In recognition that the list was not complete and that households not covered are likely to differ considerably in literacy levels than those listed, a second stage of household sampling followed. Having located one of the initially selected addresses, an interviewer in the field proceeded to list households in the same block as the initial selection, including every second household listed within the sample, to yield a total sample of six addresses within the block. Of the 600 initial selections, 12 were not utilized. Other initial addresses were not locatable, and some were business addresses. Some of the initial and second stage addresses were associated with vacant dwellings. These various forms of attrition led to the final tally of 3,231 households selected.

At the household stage, a modified Troldahl-Carter procedure was employed to select an adult respondent within the household[3]. Using a

randomly assigned sequence, the respondent-selection procedure rotated among the "youngest male," "middle (or youngest) female," "oldest male," "youngest female," "middle (oldest) male," and the "oldest female" in the household. Households not meeting the selection criteria were considered ineligible, and the next household address available in the set of six households was contacted. Up to three attempts to contact each household were made with the result of each attempt recorded by the interviewer.

A summary of the participation experience for the study is shown in table form. The data used in constructing the table was provided by Dr. Maxie Kohler, who supervised the survey field staff operation. The final participation rate consists of two distinct components. The first is the *household participation rate*. This component indicates the proportion of the 3,231 households selected for the study, where it was possible to establish who, if anyone, was to be the selected respondent. This rate was 89.0 percent, with the great majority of the attrition being the result of the inability to make a contact with anyone in the household, even after repeated callbacks. The second component is the participation rate among those 2,217 persons selected for the study from among those eligible within the 2,874 participating households. The *person-level participation rate* for this group was 81.3 percent. The major causes of the person level attrition were, in order of importance,

respondent refusal, inability to contact the selected person, and insufficient time to complete all of the survey interviews.

Combining the household and person level participation rates gives an overall participation rate of 72.3 percent. This rate is in the adequate-to-good range for a study of this type, and probably better than average. Any study which requires contacting a household, selecting a respondent from that household, and personally interviewing that respondent is bound to suffer a fair amount of sample attrition, and overall response rate of 80-85 percent is probably a practical ceiling on possible participation. In the case of the Mississippi Literacy Assessment, the length and nature of the interview would be such that one might anticipate a rate below 80 percent. However, the relatively low rate of respondent refusals (189 out of 2,009 contacted, that is 9.4 percent) is such that the study must undoubtedly have been presented in a positive light to the selected individuals by the field staff as a whole.

There are one or two aspects where somewhat higher levels of participation might have been achieved. Of the 3,220 households where an attempt to contact was made, no contact was achieved in 305 cases (9.5 percent). This figure seems moderately high, and it may have been possible to reduce it a few percentage points by use of more frequent callbacks, visiting more frequently during evening hours, etc. It must be noted, however, that to

reduce this level of noncontact would likely have required greater expenditure of money and time, which may not have been worthwhile, at least in the judgment of the investigators. The second point where improvement might have resulted from greater contact efforts was in the area of individual noncontact, where 146 out of 2,071 attempted contacts (7.0 percent) were not successful. One approach that might have reduced this loss would have been to attempt to schedule the interview with the respondent at a more convenient specified time, rather than relying on repeated callbacks to locate the individual at a convenient time by chance. Telephone calls could have been used to expedite this process, obtaining the telephone number from the household member with whom the initial contact was made. Again, however, the extra effort required would have entailed further resources than were available for the project.

The level of overall participation is sufficiently high that analysts and researchers can have confidence that the results will generalize to the population of Mississippi, especially so as there are no particular components of the survey process where the nonparticipation was substantial. Rather, it arose from each of the various survey facets contributing moderately to the overall level of nonparticipation, making it less likely that particular population subgroups are severely under-represented among the participants.

TABLE 7.1

MISSISSIPPI LITERACY SAMPLE: CALCULATION OF PARTICIPATION RATES		
Dispensation Outcome:		*Number or Percent*
I. Addresses		
Total potential addresses in clusters		3,600
Clusters not utilized		72
Addresses in survey		3,528
Out-of-scope addresses		
Cluster not locatable	59	
Business	121	
Vacant dwelling	117	
Total		297
II. Households		
In-scope households		3,231
Non-participating households		
No contact locatable	305	
High crime area	11	
Unaccounted for	26	
Other	15	
Total		357
Participating households		2,874
III. Persons		
Total potential persons surveyed		2,874
Households with no age-eligible persons in scope		208
Households with a person in scope		2,666
No sex-eligible respondent	404	
Selected person insufficiently healthy	45	
Total	449	
Total sample of in-scope persons		2,217
Non-participating persons		
Respondent unavailable	146	
Insufficient survey time	62	
Respondent refusal	189	
Interview terminated	17	
Total	414	
Total persons participating		1,803
IV. Participation Rates		
Household participation rate		*88.95%*
Person (within-household) participation rate		*81.33%*
Overall participation rate		*72.34%*

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In order to minimize the effects of undercoverage in the sampling frame, non-contacts with eligible households, and refusals, a post-stratification ratio adjustment was computed[4]. This type of adjustment is commonly utilized in face-to-face household surveys of this nature so that survey estimates of key demographic totals are in agreement with independent population figures for these factors[5]. While a number of factors preferably would have been used for this survey, one constraint is the availability of accurate estimates of such variables in both the survey and from independent sources.

Based upon these two considerations, the demographic variables chosen for the post-stratification ratio adjustment were sex, race, and age. Independent estimates of these populations for Mississippi were obtained from the database of population estimates by Woods and Poole, Inc. of Washington, D.C. These three variables were used to divide the survey sample into 24 strata. Table 7.2 contains these 24 race-sex-age strata, displaying the respective proportions contained in the realized survey sample and the independent estimates of the Mississippi population. These post-stratification adjustment factors are the ratios of the population and sample proportions for each of the sample strata.

As can be observed from inspecting this table, the realized Mississippi Literacy Assessment sample tends to reflect each of the 24 race-sex-age strata with reasonable precision, with one exception[6]. Black males between the ages

TABLE 7.2

DERIVATION OF POST-STRATIFICATION ADJUSTMENT FACTORS:
Mississippi Literacy Assessment Survey, 1990

Demographic Group	Population N	Population Proportion	Sample N	Sample Proportion	Adjustment Factor
White Males					
15-24	119,660	0.0605	75	0.0420	1.4405
25-34	131,605	0.0666	102	0.0571	1.1664
35-44	128,733	0.0651	123	0.0688	0.9462
45-54	93,812	0.0474	89	0.0498	0.9518
55-64	72,513	0.0367	88	0.0492	0.7459
65+	90,727	0.0459	88	0.0492	0.9329
White Females					
15-24	111,237	0.0563	77	0.0431	1.3063
25-34	128,597	0.0650	171	0.0957	0.6792
35-44	128,846	0.0652	111	0.0621	1.0499
45-54	95,063	0.0481	133	0.0744	0.6465
55-64	77,847	0.0394	125	0.0699	0.5637
65+	136,903	0.0692	127	0.0711	0.9733
Black Males					
15-24	85,402	0.0432	43	0.0241	1.7925
25-34	73,796	0.0373	46	0.0257	1.4514
35-44	49,596	0.0251	45	0.0252	0.9980
45-54	30,078	0.0152	22	0.0123	1.2358
55-64	24,832	0.0126	4	0.0022	5.7273
65+	41,265	0.0209	28	0.0157	1.3312
Black Females					
15-24	83,774	0.0424	50	0.0280	1.5143
25-34	79,676	0.0403	72	0.0403	1.0000
35-44	59,881	0.0302	51	0.0285	1.0596
45-54	39,839	0.0201	34	0.0190	1.0579
55-64	34,434	0.0174	33	0.0185	0.9405
65+	59,253	0.0300	50	0.0280	1.0714
TOTALS	1,977,152	1.0001*	1,787	0.9999*	

* Does not sum to 1.0 because of rounding error.

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of 55-64 are under-represented in this sample by a factor of about 5.7. This is the only strata that appears to have any noteworthy undercoverage in the realized sample. The post-stratification weights contained in the data file represent these ratios shown in the table below.

To assess the effect of the post-stratification ratio adjustment on the realized sample, Table 7.3 compares the unweighted sample frequencies, weighted sample frequencies, and independent population estimates from Woods and Poole, Inc. on race, sex, and age. This comparison reveals that the weights bring the Mississippi Literacy Assessment sample into alignment with independent population totals on these three key demographic variables, and potentially several others correlated to these three factors. To partially account for the differential within-household selection rates, a weight for household size was created. Because of incomplete information on the full composition of the sampled households, an approximation of the reciprocal of the household size was used instead. This approximation is the within-household selection adjustment. A weighting variable consisting of the within-household selection adjustment plus these post-stratification adjustments is contained in the public-use Mississippi Literacy Assessment data file.

Using the jackknife repeated replication (*jrr*) approach without stratification[7], we computed standard error estimates for a variety of sample

statistics but all restricted to means and proportions. These estimates were computed for the entire sample as well as for important subgroups such as gender, race/ethnicity, education levels, and age. The ratio of the *jrr* standard error to a similar standard error assuming a simple random sample (*srs*) of the same size is the design effect[8] of the realized Mississippi Literacy Assessment sample. For all *jrr* standard errors that were computed, the design effect (or DEFF) was also computed. The vast majority of these *DEFF*s were between 1.0 and 1.5, indicating that the Mississippi Literacy Assessment sample design appears to have the relative precision ranging from between a simple random sample of the same size to about one-third less precision. In other words, this Mississippi Literacy Assessment sample of n=1804 has the apparent sampling precision of a *srs* of between 1,804 to about 1,203 in size.

In summary, there is evidence to believe that users of the Mississippi Literacy Assessment would be slightly conservative to assume a constant design effect of 1.5 for most uses of these data. However, standard cautions should be applied when making these and other assumptions about such survey data[9]. As Rust has discussed, there are limitations to the generalization of design effects from a few key parameters to a large class of estimates[10]. Consequently, the public-use version of the data file has the *jrr* replicate identifier attached to each respondent record to permit secondary

analysts to use the jackknife replicate approach to estimate standard errors for the particular statistic needed in their analysis.

TABLE 7.3

COMPARISON OF UNWEIGHTED, WEIGHTED SAMPLE ESTIMATES TO INDEPENDENT POPULATION TOTALS: *Mississippi Literacy Assessment Survey, 1990*

Demographic Factor:	*Unweighted Percent*	*Weighted Percent*	*Population Percent*	*Difference: Unweighted*
Sex:				
Males	42.1	47.6	47.6	-5.6
Females	57.9	52.4	52.4	4.6
Race:				
Whites	72.5	65.9	66.5	5.5
Blacks	26.5	33.2	33.5	-7.5
Age:				
15-24	13.7	20.2	20.2	-7.2
25-34	21.7	20.8	20.9	0.1
35-44	18.7	18.8	18.6	-0.6
45-54	15.6	13.2	13.1	1.9
55-64	13.9	10.6	10.6	2.4
65+	16.3	16.5	16.6	-0.6

* **Note:** percentages may not round to 100 because of rounding error; however, for Race there is an omitted category of "other" which precludes summing to 100 percent.

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ENDNOTES TO THE APPENDIX

[1]U.S. Bureau of the Census, *Statistical Abstract of the United States: 1987*, (Washington, D.C.: U.S. Government Printing Office, 1987).

[2]James T. Massey and Steven L. Botman, "Weighting Adjustments for Random Digit Dialed Surveys," in Robert M. Groves, Paul P. Biemer, Lars E. Lyberg, James T. Massey, William L. Nicholls II and Joseph Waksberg (eds.), *Telephone Survey Methodology*, (New York: Wiley, 1988), pp. 140-60.

[3]Verling C. Troldahl and Roy E. Carter, "Random Selection of Respondents Within Households in Phone Surveys," *Journal of Marketing Research*, 1 (May 1964): 71-76.

[4]James T. Massey and Steven L. Botman, "Weighting Adjustments;" Eun Sul Lee, Ronald N. Forthafer and Ronald J. Lorimor, *Analyzing Complex Survey Data* (Newberry Park, CA: Sage, 1989).

[5]For a description of how NHIS uses a post-stratification ratio adjustment, see J. A. Bean, "Estimate and Sampling Variability in the Health Interview Survey," *Vital and Health Statistics Series 2* (No. 38, Publication No. (HRA) 74-1288, Washington, D.C.) and U.S. Census Bureau Technical Report No. 40 (1978) for the Current Population Survey (CPS).

[6]Compare these post-stratification ratios with those contained in Lee et al., *Complex Survey Data*, p. 20 for a national sample of about 1,500 respondents conducted by NORC of Chicago, Illinois.

[7]Westat, Inc., *The Wesvar Procedure:* β *Version*. Rockville, MD: Westat, Inc,; Keith Rust, "Variance Estimation for Complex Estimators in Sample Surveys," *Journal of Official Statistics*, 1 (4): 381-397; Keith Rust, "Practical Problems in Sampling Error Estimation," invited paper 10.3 of the Proceedings of the 46th Session of the International Statistical Institute, September 8-16, 1987, Tokyo, Japan; and Lee et al., *Complex Survey Data*.

[8]Kish, Leslie. *Survey Sampling*. (New York: Wiley, 1965).

[9]Lee et al., "Complex Survey Data;" Rust, "Practical Problems."

[10]Rust, "Practical Problems."

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